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EARLY INDIAN METHODS OF FISHING.

Pennsylvania's Fish Exhibit at the World's Columbian Exposition, Chicago, 1893.

FISH, FISHING

AND

FISHERIES OF PENNSYLVANIA.

COMPILED FOR THE STATE FISH COMMISSIONERS

BY

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Associate Editor of Philadelphia Public Ledger.

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VIRTUE
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Representative of State Fish Commission at Columbian Exposition, Chicago, Ills.,

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FISH FISHING AND FISHERIES OF PENNSYLVANIA.

CHAPTER I.

Primeval Fishermen and Fishing.

Less than three hundred years ago the rivers and streams within the confines of what is now the State of Pennsylvania were fairly alive with fish. Shad, herring and other migratory fishes annually ascended the Susquehanna and Delaware rivers and their tributaries in such vast multitudes that, according to one old writer, the still waters seemed filled with eddies, while the shallows were beaten into foam by them in their struggles to reach the spawning grounds. As the rivers of Alaska are said to be filled to-day with salmon, so were the Susquehanna and Delaware described to have been with other fishes some two hundred and fifty years ago.

As the rivers were in those days with migratory fish, so were the mountain and meadow streams with trout. Whenever the water conditions were at all favorable, this great game fish lived in countless numbers, and like the shad and other migratory fishes, grew to much larger size than are now commonly found. Even catfish, suckers and other finny members of life in those early days reached a greater fullness of growth.

At that time, the Indians, of what is now Pennsylvania, throughout its whole extent, and indeed, for some distance north, west and south depended almost wholly on the fish supply for food. These people could with much truth be called fish-eaters. Proof of this is found in every ancient Indian village site, where the ashes and charcoal of primeval camp fires have preserved bones of animal food devoured by the red-skinned hunters. In every case, no matter whether the village was located beside a large water course or at some distance from it, bones of fishes have been found among the camp fire ashes. Bones of deer, elk and bear, the principal animal food of the Indians, are also discovered in great quantity, but insignificantly so when compared with the number of fish bones found.

If further proof be wanting as to the great dependence on fish, it is found in the ancient shell heaps on the sea coast, the accumulations of the Indians who visited the ocean annually from miles inland for mollusks which they smoked for winter use. Among these shell heaps are discovered numerous fish spears and hooks, together with abundant remains of fishes. Thus while mollusk gathering was the primary object of the ocean visits, the Indians kept well in mind the value of sea fishes as an article of food.

It is by the remains of bones found in the ashes also that the great size of the fish of those days, as compared with those of the present, can be determined. Bones of catfish and suckers of more than double the size of those now caught are frequently found, skeletons of trout, which must have weighed when in the flesh from two to four pounds are quite common, and there are no lack of remains of shad which would have tipped the scales fairly at twelve pounds.

As might be expected, depending so largely on this class of food supply, the Indians were expert fishermen. Men, women and children engaged regularly in the calling, not only to supply immediate wants, but for future supply, preserving their stock by sun and smoke curing. John Ogelby, a well-known writer, in treating of the New England Indians says: "In the trade of fishing they are very expert, being experienced in all baits for different kinds of fishes * * * * Since the English came they are furnished with English hooks and lines, for before they made the latter of hemp, being more curiously wrought and of stronger material than ours and hooked with bone hooks * * * * They make likewise very strong sturgeon nets, with which they catch sturgeon of twelve feet or more in length. Their cordage is so even, soft and smooth that it looks more like silk than hemp." The same skill and knowledge possessed by the Indians of New England, were had by those in and about the Commonwealth of Pennsylvania, and undoubtedly both were the result of long acquaintance and practice.

It will thus be seen that the savages who occupied the soil of America before the white men, were no tyros in the art of fish catching. They were learned in all that pertained to it. In the pursuit they used weirs and traps; sieves, gill and scoop nets; spears, bows and arrows and gigs; hand, pole and set lines. They even knew how to stupify fish by using intoxicating substances. Besides these things they constructed pens and preserves in which fish could be kept alive until wanted. To the children mainly were left the use of the bow and arrow in fish killing, and in this art, by no means easy of acquirement, they were, according to Loskiel a Moravian missionary, adepts.

Wherever the streams were shallow, a favorite method of catching fish was by the use of drive-ways. As soon as the shad and herring appeared on their annual journey to the spawning beds no time was lost by the Indians. Large stones were placed close together in the water so as to make a huge V shaped pen, much after the pattern of the brush built drive-ways used by them for capturing land animals. Then every redskin in the village or villages, if friendly relations were in order, men, women and children fell in line across the river, and moved slowly towards the open end of the drive-way, yelling at the top of their voices and beating the water vigorously with brush, which each were armed with. Affrighted, thousands of fish fled straight to the pen built for them, and when they were well within, escape was barred by a huge net

stretched across the entrance. Thus the fish were imprisoned to be slaughtered at leisure by their captors.

In 1680, Mahlon Stacy, one of the first settlers of New Jersey, wrote a letter to a brother in England, in which he gave a somewhat similar method used by the Indians for fish catchings. The letter is so interesting that, though it contains some other matters not germain to the subject of this work, it is herewith given entire:

"But now a word or two of those strange reports you hear of us and our country: I affirm they are not true, but fear they were spoke from a spirit of envy. It is a country that produceth all things for the support and sustenance of man in a plentiful manner; if it were not so, I should be ashamed of what I have before written. But I can stand, having truth on my side, against and before the face of all gain-sayers and evil spies. I have traveled through most of the places that are settled and some that are not, and in every place I find the country very apt to answer the expectations of the diligent. I have seen orchards laden with fruit to admiration, their very limbs torn to pieces with the weight, and most delicious to the taste and lovely to behold. I have seen an apple tree, from a pippin-kernel, yield a barrel of curious cider; and peaches in such plenty that some people took their carts a peach gathering; I could not but smile at the conceit of it. They are a very delicate fruit and hang almost like our onions that are tied on ropes. I have seen and known, this summer, forty bushels of bold wheat off one bushel sown, and many more such instances I could bring, which would be too tedious here to mention. We have, from the time called May until Michaelmas, great store of very good wild fruits, as strawberries, cranberries and hurtleberries, which are like our bilberries in England, but far sweeter; they are very wholesome fruits. The cranberries are much like cherries for color and bigness, which may be kept till fruit come again; an excellent sauce is made of them for venison, turkeys and other great fowl, and they are better to make tarts than either gooseberries or cherries. We have them brought to our houses by the Indians in great plenty. My brother, Robert, had as many cherries this year as would have loaded several carts. It is my judgment, by what I have observed, that fruit trees in this country destroy themselves by the very weight of their fruit. As for venison and fowls we have great plenty; we have brought home to our houses by the Indians, seven or eight fat bucks a day, and sometimes put by as many, having no occasion for them. And fish, in their season, are very plentious. My cousin, Revell, and I, with some of my men, went last third month into the river ("The Delaware") to catch herrings, for at that time they came in great shoals into the shallows. We had neither rod nor net, but, after the Indian fashion, made a round pinfold, about two yards over and a foot high, but left a gap for the fish to go in at, and made a bush to lay in the gap to keep the fish in; and when that was done, we took two

long birches and tied their tops together, and went about a stone's cast above our said pinfold; then hauling these birch boughs down the stream, where we drove thousands before us, but so many got into our trap as it would hold. And then we began to haul them on shore, as fast as three or four of us could, but two or three at a time, and after this manner, in half an hour, we could have filled a three-bushel sack of as good, large herrings as ever I saw. And as to beef and pork, here is a great plenty of it, and cheap, and also good sheep. The common grass of this country feeds beef very fat; I have killed two this year and, therefore, I have reason to know it; besides, I have seen this fall, in Burlington, killed eight or nine fat oxen and cows on a market day and are very fat. And though I speak of herrings only, lest any should think we have little other sorts, we have great plenty of most sorts of fish that I ever saw in England, besides several other sorts that are not known there, as rocks, catfish, shads, sheepsheads, sturgeons; and fowls plenty, as ducks, geese, turkeys, pheasants, partridges and many other sorts that I cannot remember, and would be too tedious to mention. Indeed, the country, take it as a wilderness, is a brave country, though no place will please all. But some will be ready to say, he writes of conveniences, but not of inconveniences. In answer to those I honestly declare, there is some barren land, as (I suppose) there is in most places of the world, and more wood than some would have upon their lands; neither will the country produce corn without labor, nor cattle be got without something to buy them, nor bread with idleness, else it would be a brave country, indeed. And I question not but all then would give it a good word. For my part, I like it so well I never had the least though of returning to England, except on account of trade."

That nets were largely used by the Indians, has been proved beyond the shadow of a doubt. Not only do Ogelby, Loskiel, Mahlon Stacy, Peter Kalm and other early writers bear witness to having seen them, but still more ancient signs of their use have been found. On all village sites are found remains of Indian pottery, and this pottery the Aborigines were fond of ornamenting, and much of it in this connection bears the imprint of fish nets. Besides this a few meshes, evidently centuries old, have been found in the Mammoth cave. These impressions and the meshes found show, curiously enough, that the knots with which the nets were made are identical with those in use to-day by the whites.

Sieves and gill nets had lead lines made of small circular flat stones having two deep notches to keep the lines from slipping. These "leads" have been found by the thousand in the Delaware and Susquehanna rivers. One of the most curious finds of these relics was made by Dr. C. C. Abbott, curator of the Archæological Department of the University af Pennsylvania, from whom the greater number of the facts contained in this chapter are obtained. Some years ago, in a mud de-

posit on the banks of the Susquehanna, Dr. Abbott came upon a series of about thirty seine "leads" stretched in an irregular line about eighteen inches apart. From their position and other evidence found in connection therewith, it was apparent that they formed part of a net which had been set and then abandoned.

Instead of by buoys, as now used, nets were anchored by stones, carefully trimmed and weighing from fifteen to twenty pounds each. Many of these are frequently found in the main rivers and their tributaries of Pennsylvania, mute testimony to the great extent to which aboriginal fishing was carried on.

Ice fishing with gill nets was also a favorite method with the Indians and these were let beneath the ice with wonderful skill and effect.

That gigging and spearing were carried on to an enormous extent, is shown by the countless number of spear-heads found by archæologists and relic hunters every year. The spears were either tipped with barbed bone or with long slender pieces of chipped stone of a flinty character. As a general rule, much pains were given to their manufacture for most of the specimens found show evidences of beautiful workmanship.

Of the exquisite character of the lines used, mention has already been made, and the hooks which were used were scarcely less creditable to their skill. These were usually fashioned from bone or stone and occasionally of bird claws (probably of the hawk). So effective were these articles, that Peter Kalm, a pupil of the famous botanist, Linnæus, who traveled in this country about the middle of the last century, asserted that many white people used them in preference to their own brought from abroad.

The dipsies for hand and pole lines were also very carefully and symmetrically modelled. The most elaborate and handsome were fashioned of hematite and shaped like a common plumb bob. Some had the upper portion groved and were encased in netting, while others had holes drilled through them and were fastened to the line without the precaution of a net to prevent loss.

Harriot, a writer in 1585, thus quaintly describes the Indian methods of fishing:

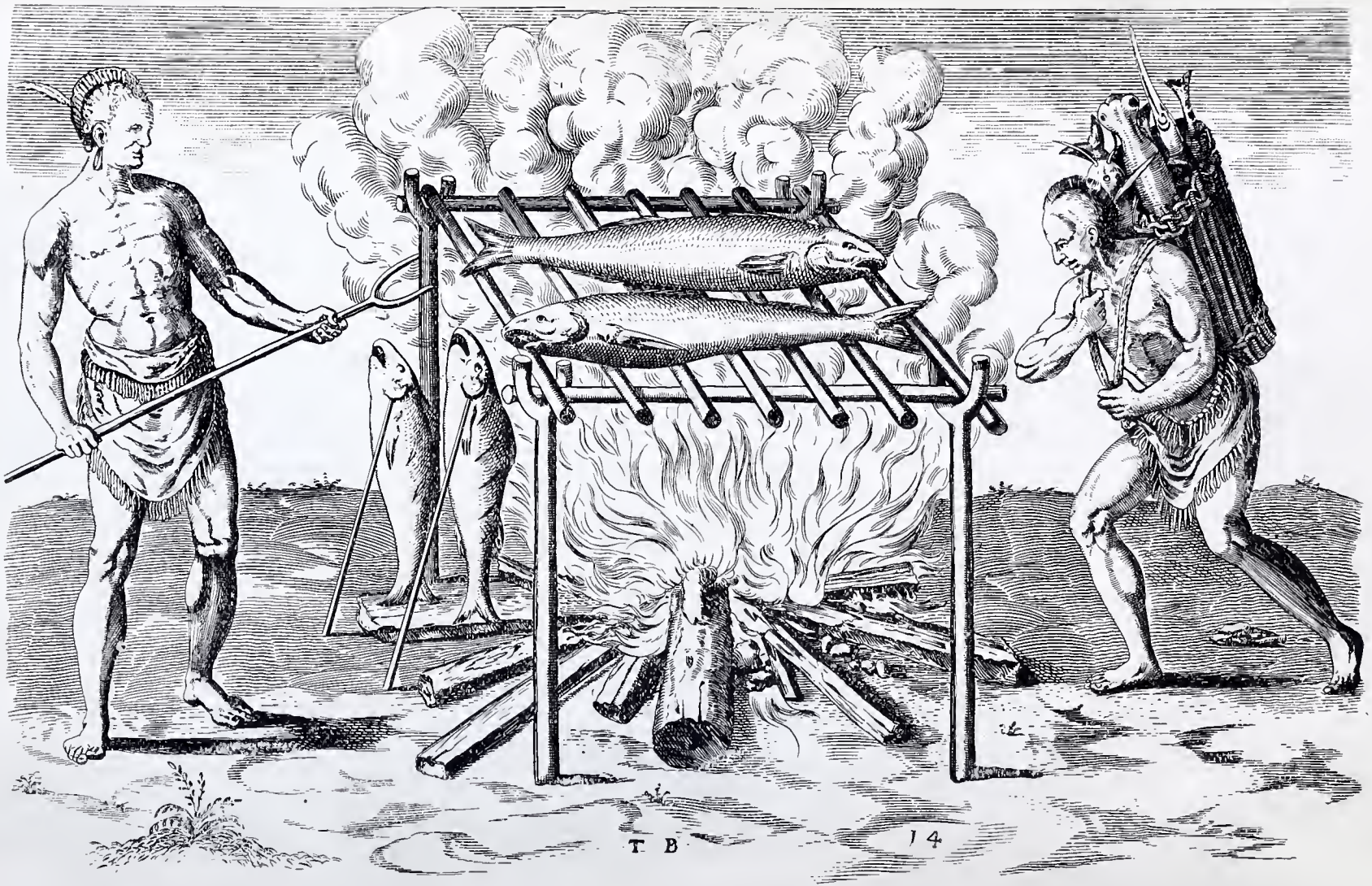
"They haue likewise a notable way to catche fishe in their Rivers, for whearas they lacke both yron and steele, they fasten vnto their Reedes or longe Rodds the hollowe tayle of a certaine fishe like to a sea crabb, in steede of a poynte, wherwith by nighte or day they stricke fishes and take them off into theire boates. They also know how to vse the prickles and pricks of other fishes. They also make weares, with settinge opp reedes or twiggs in the water, which they soe plant one with another that they growe still narrower and narrower, as appeareth by this figure. Ther was neuer seene among vs soe cunninge a way to take fish withall, whereof sondrie soıts as they fownde in their Rivers vnlike vnto ours, which are also of a verye good taste. Doubtless yt is a pleas-

ant sighte to see the people, somtymes wadinge, and goinge sometymes sailinge in those Rivers, which are shallowe and not deepe, free from all care of heapinge opp Riches for their posterite, content with their state, and liuing frendlye together of those things which god of his bountye hath giuen vnto them, yet without giving hym any thankes according to his desarte.

"So sauage is this people and depriued of the true knowledge of god. For they haue none other then is mentioned before in this worke."

Besides telling us how the Indians catch fish, Harriot also tells us how they cook them. He says:

"After they haue taken store of fishe, they gett them vnto a place fitt to dress yt. Ther they sticke vpp in the grownde 4 stakes in a square roome and lay 4 potes vpon them, and others ouer thwart the same, the same like vnto an hurdle of sufficient heigthe, and laying their fishe vpon this hurdle, they make a fyre vnderneathe to broile the same, not after the manner of the people of Florida, which doe but schorte (schorche) and harden their meate in the smoke only to Reserue the same during all the winter. For this people, reseruinge nothinge for store, thei do broile, and spend away all att once, and when they haue further neede they roste or seethe fresh, as we shall see hereaffter. And when as the hurdle can not holde all the fishes, they hange the Reste by the fyrres on sticks sett vpp in the grounde a gainste the fyres, and than they finishe the reste of theire cookerye. They take good heede that they bee not burntt. When the first are broyled they lay others on that weare newlye brought, continuing the dressinge of their meate in this sorte vntil they thincke they haue sufficient."



EARLY INDIAN METHODS OF COOKING FISH.

CHAPTER II.

Early Fishing on the Susquehanna.

The vast abundance of fish in the rivers and streams of the colony of Pennsylvania excited the astonishment of the early European settlers, prepared as they had been beforehand by tales of the multitude of animal life in the new country. One amazed traveler on his return to England in 1588 writes: "For foure monethes of the yeere, February, March, Aprill and May, there are plentie of *Sturgeons*, and also in the same monethes of *Herrings*; some of the ordinary bignesse as ours in England, but the most part farre greater, of eighteene, twentie inches, and some two foote in length and better; both these kinds of fishe in those monethes are most plentiful, and in best season which were founde to bee most delicate and pleasant meate.

"There are also *Troutes, Porpoises, Rayes, Oldwines, Mullets, Plaice,* and very many other sortes of excellent good fish, which we have taken and eatan, whose names I know not but in the country language; we have of twelve sorts more the pictures as they were drawn in the countrey with their names."

The fame of the fishing, especially that of the shad of the Susquehanna, even reached the hardy and thrifty settlers of Connecticut, and many of them left their homes in that part of the country and came to and settled in the picturesque Wyoming Valley, from Wyoming to Tioga Point, now known as Athens. They brought their nets with them and each neighborhood established a fishery for its own accommodation. For a long time the chief food of these hardy people was taken from the river. Soon after their arrival trouble arose between them and the government of Pennsylvania over the right of possession of the Wyoming Valley, and a war was begun, which lasted for thirty years, during which buildings, farm produce and personal effects were destroyed by fire or carried away as plunder, and much suffering was caused. For much of this time the Connecticut settlers had to live almost altogether on the fish caught. Indeed it was sometimes difficult to obtain even these, for, according to records, it was a matter of bitter complaint in 1784 that the Pennamites had destroyed their sieves, and so reduced them to the verge of starvation. To such destitution were they driven in some instances that, according to one old settler, on one occasion when he came back from a short excursion with a companion he found everything destroyed, and the only edible thing they could discover were two dead shad in the river bank. These they cooked and

ate, and in their famished state they declared a more "delicious meal was never partaken of" by either of them. In addition to these troubles the Wyoming settlers were great sufferers from other sources, the terrible massacre by the Indians on July 30, 1778, is a matter of history with which everybody is acquainted. Notwithstanding these things, the hardy pioneers persisted in their location, but it was not until after the close of the Revolutionary war, when all differences were settled, that the fishing industries of the Susquehanna were allowed to be conducted in peace, and their vast product made manifest. The bloodshed through which they passed left the settlements with so many widows and fatherless children that special provisions of bounty had to be made for them. In this particular fish formed the chief article. An arrangement was made among the fishermen by which one of the hauls at each fishery every year was given to the widows and the fatherless of the neighborhood, and to this was given the name of the "widows' haul." By common consent it was agreed that the widows should have every fish of a haul made of the first Sunday after the shad-fishing commenced. In one of these annual widows' hauls, it is given on good authority, that at the Stewart fishery alone, about midway between Wilkes-Barre and Plymouth, ten thousand shad were caught and turned over for the fund.

Some years ago the Hon. P. M. Osterhout contributed to the Historical Society of Luzerne county a deeply interesting paper on the early fisheries of the Susquehanna. After noting the arrival of the Connecticut settlers he says: "Say ten men (and it took about that number to man a seine) would form themselves into a company for the purpose of a shad fishery. They raised the flax, their wives would spin and make the twine and the men would knit the seine. The river being on an average forty yards wide, the seine would be from sixty to eighty yards long. The shad congregated mostly on shoals on the point of some island for spawning, and there the fisheries were generally established. Shad fishing was mostly done in the night, commencing soon after dark, and continuing till daylight in the morning, when the shad caught would be made into as many piles as there were rights in the seine. One of their number would then turn his back and another would touch them off saying, pointing to a pile, "who shall have this, and who shall have that," and so on till all were disposed of, when the happy fishermen would go to their homes well laden with the spoils of the night. Between the times of drawing the net, which would be generally about an hour, the time was spent in the recital of fish stories, hair-breadth escapes from the beasts of the forests, the wily Indian, or the Yankee production, the ghosts and witches of New England.

This method of dividing fish lasted for many years, for a gentleman named H. C. Wilson, in 1881, a resident of Mt. Vernon, Ohio, and in his boyhood days a dweller on the banks of the Susquehanna, gives testimony to the same effect. He also learned to knit nets, the work being

done on rainy and cold days and evenings. The nets he says were knit in sections by the shareholders, each one owning so many yards of net, and each one receiving his share of fish, according to the number of yards owned. When the sections were all done one or two of the most expert would knit them together and hang them besides, putting on the corks and leads.

The early shad fisheries were not common property. The owner of the soil was the owner of the fishery, and no one was allowed to fish without a permit. When the owners were not using the seines they often hired them out to others and take pay in fish. The seiner's share was always one-half the catch.

In working up the early fisheries of the Susquehanna those interested in such matters are indebted chiefly to the Wyoming Historical and Geological Society of Wilkes-Barre, who appointed a committee, with Mr. Harrison Wright as chairman, to make thorough investigation. These gentlemen gathered every scrap of information pertaining to the subject that was obtainable from all parts of the vast stretch of six hundred and thirty-five miles of the Susquehanna and its great branches. In preparing this chapter, a large portion of the report of this work has been used.

The county records, according to the report, only go back to 1787. In that year it was found that one Caleb Wright purchased a half interest in a fishery between Shickshinny and Nanticoke, called the "Dutch fishery." For this share he paid £20 in "lawful money of Pennsylvania," equivalent to $53.33. In connection with this particular case is a note which gives an idea of the vast amount of fish that must have ascended the Susquehanna in those days, it being related that a son of Caleb Wright once received as his share of one nights' fishing 1,900 shad. From other investigations it is shown about the same period a right in a fishery was worth from ten to twenty dollars, while once in a while such a right was held at as much as one hundred dollars. To the holders of these rights the returns seem to have been very large. One Jonathan Hunloch's half interest in the Hunloch fishery was considered worth from five hundred to six hundred dollars per annum. Others ran from three hundred to four hundred dollars a year, while sometimes from thirty to forty dollars a night were taken in by each fisherman. These fisheries, as far as research can determine, netted some $12,000 annually, though some are inclined to place the returns at a very much higher figure. Even at $12,000 a year, the fisheries of the Susquehanna were much more profitable than at the present day.

Early in the present century, according to the finding of the Wilkes-Barre Society, there were some forty permanent fisheries between Northumberland and Towanda, to wit:

At Northumberland, or just below, was Hummel's fishery; between Northumberland and Danville there were eight fisheries in order from

Northumberland up, as follows: 1. Line's Island lower fishery; 2. Line's Island middle fishery; 3. Smith's fishery; 4. Line's Island upper fishery; 5. Scott's fishery; 6. Grant's fishery; 7. Carr's Island fishery; 8. Rockafeller's. The next fishery of which there is a record was the fishery of Samuel Webb, located about four miles above Bloomsburg. Above this point about four miles, and six miles below Berwick, was the fishery of Benjamin Boon; the next was located just above the town of Berwick, and about a mile and a-half above Berwick was the Tuckahoe fishery (this last is the same as the Nescopeck fishery mentioned in Pearce's history); the next was at Beach Haven. Between this latter place and Nanticoke dam there were three, viz.: one at Shickshinny; one just below the mouth of Hunlock's creek, and one called the "Dutch" fishery on Croup's farm. Above Nanticoke there was one belonging to James Stewart, about opposite Jameson Harvey's place; one at Fish Island, and one at Steele's Ferry, called the Mud fishery. The next was on Fish's Island, three-quarters of a mile below the Wilkes-Barre bridge; the next was Bowman's fishery, immediately below the Wilkes-Barre bridge; the next was the Butler fishery, a little above the bridge; the next was at Mill Creek, a mile above the bridge; the next was the Monocacy Island fishery; the next Carey's; the next was on Wintermoot Island, this last landing on the left bank above the ferry at Beauchard's; the next was at Scovel's Island, opposite Lackawanna Creek; this and the Falling Spring fishery next above belonged to parties living in Providence, away up the Lackawanna. The next above was at Harding's, in Exter township; the next above was at Keeler's in Wyoming county; the next was at Taylor's (or Three Brothers) Island; the next was at Hunt's ferry *circa*, five miles above Tunkhannock; the next was Grist's Bar, about a mile above Meshoppen; the next was at Whitcomb's Island, a mile below Black Walnut bottom; a half a mile above this fishery was the Sterling Island fishery; and the next above was Black Walnut, and half a mile further up was the Chapin Island fishery; the next was at the bend at Skinner's Eddy; the next was at Browntown, in Bradford county; the next was at Ingham's Island; the next was at the mouth of Wyalusing creek; two miles further up was one at Terrytown; the next and last that there is any record of was at Standing Stone, about six miles below Towanda.

At the eight fisheries near Northumberland three hundred shad was a common haul, while some ran from three to five thousand. About the year 1820, the Rockafeller fishery, just below Danville, gave an annual yield of from three to four thousand, worth from twelve and a half cents to twenty-five cents apiece.

The most productive fishery, according to a Mr. Fowler, was the one just above Berwick. Here, he says, he has assisted in catching "thousands upon thousands," but does not give the annual yield. The same gentleman also relates that at the Tuckahoe fishery "many thousands

were caught night and day in the early spring." At the Webb and Boon fisheries the hauls were immense. Indeed, so many shad were taken at the last named place that it is said a market could not be found for nearly all of them, and that they were actually hauled to Boon's farm where they were used as manure to enrich the ground.

The annual catch at Hunlock's fishery is stated to have been more than ten thousand. At the Dutch fishery, in one night, thirty eight hundred shad were taken, while at the Fish Island fishery it is related on unimpeachable testimony, that nearly as many shad were taken once at a single haul as were taken at Hunlock's in a whole year.

Just before the dam was put in, a Mr. Jenkins recollects having seen a haul at Monocacy Island of twenty-eight hundred; at Scovel's Island the catch was from twenty to sixty a night; at Falling Spring, fifty to three hundred a night; at Taylor's Island, from two hundred to four hundred a night; at Wyalusing the annual catch was between two and and three thousand, and at Standing Stone between three and four thousand. Major Fassett says that at the Sterling Island fishery "over two thousand were caught in one day in five hauls."

From the foregoing, it is deduced that the fisheries down the river were much more valuable than those above. Above Monocacy no catches were heard of that were over two thousand, while below that point they were larger, and while from three to four hundred dollars seemed to be the general value above, the fishery at Hunlok's, twelve miles below, was worth from a thousand to twelve hundred dollars per annum. As the river was ascended the shad appear to have decreased in numbers but increased in size.

The opinion seems to be general that the great size obtained by the Susquehanna shad was due to the long run up the fresh-water stream (carrying the idea of the survival of the fittest); that they were of great size, is beyond doubt, nearly every one who recollects them insists on putting their weight at almost double that of the average Delaware shad of to-day.

Mr. Van Kirk gives as the weight of the shad caught at the fisheries in Northumberland and Montour counties as from three to nine pounds.

Mr. Fowler says he has assisted in catching thousands weighing eight and nine pounds at the fisheries in Columbia county. Mr. Harvey, speaking of the Luzerne county shad, says: "Some used to weigh eight or nine pounds, and I saw one weighed on a wager which turned the scales at thirteen pounds." Major Fasset, speaking of those caught in Wyoming county, says: "The average weight was eight pounds, the largest twelve pounds." Dr. Horton says of the shad caught in Bradford county, that he has seen them weighing nine pounds; ordinarily the weight was from four to seven pounds.

The price of the shad varied, according to their size, from 4*d.* to 25 cents, depending, of course, upon their scarcity or abundance. At

the town meeting held at Wilkes-Barre April 21, 1778, prices were set on articles of sale, *inter alia*, as follows: Winter-fed beef, per pound, 7*d.*; tobacco, per pound, 9*d.*; eggs, per dozen, 8*d.*; shad apiece, 6*d.* At one time they brought but 4*d.* apiece. A bushel of salt would at one time bring a hundred shad.

At the time the dam was built they brought from 10 to 12 cents. On the day of the big haul Mr. Harvey says they sold for a cent apiece (Mr. Dana says 3 coppers). Mr. Isaac Osterhout remembers a Mr. Walter Green, who gave twenty barrels of shad for a good Durham cow.

Mr. Roberts says that in exchanging for maple sugar one good shad was worth a pound of sugar; when sold for cash shad were worth 12½ cents apiece. Major Fassett says the market price of the shad was $6 per hundred. Dr. Horton says the shad, *according to size*, were worth from 10 to 25 cents.

Mr. Hollenback, in calculating the value of the fisheries near Wyalusing, has put the value of the shad at 10 cents apiece. In 1820 they were held in Wilkes-Barre at $18.75 per hundred. Mr. Fowler says they were worth 3 or 4 cents each.

Every family along the river having any means whatever, had its half barrel or more of shad salted away each season, and some smoked shad hanging in their kitchen chimneys. But those living immediately along the river were not the only beneficiaries of this magnificant food supply. Its vastness and its cheapness was spread abroad throughout the commonwealth. Country folks from a radius of fifty miles came to the Susquehanna to get their winter supply. Even the waters of the Delaware seemed to yield an insignificant number as compared to the Susquehanna, for people journeyed to the latter river from the New York State line on the north, and from Easton on the east, at the junction of the Delaware and the Lehigh rivers. Among the seekers for this splendid food fish that joined this army were large numbers of residents from and about Philadelphia.

All these people, or a large portion of them camped on the river bank, and they brought with them whatever they had of a marketable nature in payment as well as to partial reimbursement for the journey. From the New York line and Easton was brought maple sugar and salt; from Milton, cider and whiskey and a mixture of the two which when imbibed, even in moderate quantities produced such a violent intoxication that it was called "cider royal," and was analagous to a purely American drink known as a "stone fence." The Quaker city folks brought leather, iron and commodities of a like nature.

Sometimes residents along the Susquehanna river took their surplus catches of shad to distant markets without waiting for trade to come to them. Mr. Isaac Osterhout, an aged gentleman, says he recollects well when a boy about the year 1822 or 1823, he went with a neighbor to Salina, New York, after salt, taking with them shad and whetstones

with which to trade. A relative of the same gentleman tells of a firm named Miller & McCard trading at Tunkhannock which did quite an extensive business in shad, sending the cured ones up the river into New York State and far down the river, presumably Baltimore.

The two gentlemen who composed this firm were originally residents of Coxestown—a small place on the Susquehanna, about five miles from Harrisburg, but as early as 1800 moved up the river to Tunkhannock in a Durham boat, on which they carried their stock of goods. They cured large quantities of shad which they bought from the fisheries in the neighborhood. The difficulties they labored under in this work of curing must have been very great, for salt was extremely scarce, in fact, it is said, there was none except what was brought in wagons from the cities in the way of trade, or by the same kind of vehicles from the salt works at Onondaga, New York. So precious was this article that it was not unusual that a bushel of it would purchase one hundred shad.

Besides the people who traveled to the Susquehanna river for shad, and the residents there who took them to distant points for sale, nearly every boat which plied the Susquehanna, took down shad, paying therefore in leather, cider, whiskey, cider royal, salt, iron and other material.

Besides that no other deep sea fish appears to have gone up the west branch in such quantities as they did up the north branch, unless it be inferior grade food fishes like the eel.

In the performance of the work of securing data for their report, Mr. Harrison Wright and his committee interviewed by letter or in person a large number of the old settlers. Besides this, country records, files of old newspapers, the numerous printed histories, were all consulted. Most of the letters and interviews were of such an interesting character that some are here given. Joseph Van Kirk, a resident of Northumberland, says: "An incident in connection with shad fishing presents itself to my mind, related often by my grandmother: A party of Indians, returning from a treaty at Philadelphia, landed their canoes, came to her house to borrow her big kettle to cook their dinner in. After building a fire and hanging over the kettle, they put in the shad, just as they were taken from the river, with beans, cabbage, potatoes and onions."

According to Jameson Harvey, the owners of fish-houses used to have arrangements so that when they run out of salt they could dry and smoke the shad, as they now do herring and salmon. Some of the shad used to weigh eight or nine pounds. I saw one weighed on a wager turning the scales at thirteen pounds; about seventy or eighty would fill a barrel. The shad improved very much coming up the river, those caught in this valley being very much larger and finer than those caught at Columbia.

Mr. C. Dorrance, of Scottsville, says: I cannot better illustrate the

value and importance of the shad fisheries at that early day to the people on the Susquehanna river than to repeat an anecdote told me long years after by a genial gentleman of New England, who in youth visited my father at his home in Wyoming.

Leaning on the front gate, after breakfast, as the little children were passing to school, each with a little basket, the universal answer from their cherry, upturned little faces was, "bread and shad," "bread and shad" (corn bread, at that).

The cheapness with which shad and other fishes could be had, especially in Philadelphia and Pittsburg, was not altogether an unalloyed pleasure to every dweller in the commonwealth in the earlier years of the present century. The low prices tempted many master mechanics to keep their apprentices almost altogether in a fish diet. To this the embryonic workmen at length objected, and a bitter, wordy strife ensued, a battle which ended triumphantly for the apprentices who succeeded in having inserted in their indentures a clause that they were not to be fed on fish more than twice a week. One old gentleman with whom the writer is acquainted says, however, that he thinks the condition of the apprentices was scarcely bettered through their triumph for about that time the "merino sheep craze" swept over the country, and for fish was substituted mutton and molasses in generous quantities.

CHAPTER III.

Early Fisheries of the Delaware.

To the world the Delaware river is known. On its banks is nestled the third largest metropolis in the Union, and one in which its inhabitants justly take pride in calling the "city of Brotherly Love" and of "Homes." On the broad bosom of the stream for thirty miles above Philadelphia thousands of craft, great and small, are constantly moving. Dividing Pennsylvania from New Jersey, and in part from New York, its course is through a country famous in history and in verse, and for the magnificance of its scenery.

Above Trenton, the capital of New Jersey, shallowing suddenly, the river speeds its way southward in sparkling wavelets and foam beaten rifts over a rough, stony bottom, resting frequently in long reaches of pools in the depths of which goodly fish love to lie.

To the traveler journeying along the banks of the Delaware in the swiftly moving trains of the Belvidere Division of the Pennsylvania railroad, there seems to be a contest between the hills and the meadow lands going on. At the outset the meadows, carpeted with flowers, grass or grain, appear to have the best of it and to be pushing the rolling hills, clothed in evergreen and deciduous trees backward, but as the train speeds along, it is seen that little by little, the rugged hills blot out the low lands till below Easton they seem to dare even to attack the river itself, thrusting themselves in sheer precipices several hundred feet high at the very waters edge and in their picturesque features rivalling the famous palisades of the Hudson river.

Above Easton there is no handsomer scenery in the state. The hills become more and more lofty, till at the Delaware Water Gap, now a famous summer resort, but in the misty past the terminal point of a vast lake, the river cuts its way through the Blue Ridge mountains.

The Delaware is to-day among the best, if not the best, of the shad rivers on the Atlantic coast, and though the Schuylkill has become barren in this respect, there are many other of the tributaries that still rank high. Among them, and all in New Jersey, are Cooper's creek and the Rancocas, above Gloucester city, with Big Timber creek, Salem creek, Raccoon creek, Old Man's creek and Woodbury creek, emptying in below that city.

In Big Timber and Rancocas creeks, the shad run up a distance of fifteen or twenty miles. The former is one of the best shad fishing streams on the Jersey shore, and has been successfully fished for many

years, some of the fisheries being located eight and ten miles above its mouth. It is a singular fact in connection with this stream that shad have been caught at these fisheries a week or ten days earlier than the nets in the main waters of the Delaware. Many theories have been advanced to account for this curious fact but none give general satisfaction.

Big Timber creek is about thirty miles in length, rising in the water shed between the Delaware and the Atlantic, and has many sinuosities, with deep holes, from thirty to forty feet of water.

It is unfortunate that, as compared with the Susquehanna river, but little is known of the early fisheries of the Delaware, though it is said that the early Dutch and German settlers either did not know of or did not make use of the seine for fish catching until long after the Connecticut colonies in the Wyoming Valley.

While there is no particular reason for making the assertion, it may be that the English settlers along the Delaware held the same sentiments towards shad that some of those did who settled on the banks of the Connecticut river about two centuries or more ago.

According to Judd's History of Hadley, Massachusetts, "the shad, which were very numerous, were despised and rejected by a large portion of the English for nearly one hundred years in the old towns of Connecticut, and for about seventy-five years in those Hampshire towns above the falls. It was discreditable for those who had a competency to eat shad, and it was disreputable to be destitute of salt-pork, and the eating of shad implies a deficiency of pork. * * * *

"There is told a story in Hadley of a family in that place who were about to dine on shad when it was not reputable to eat them. Hearing a knock at the door, the platter of shad was immediately hid under a bed."

The brief mention of the vast resources of the Delaware in the way of fishes was mentioned by Mahlon Stacy in a letter to his brother in England in 1680, and which has been quoted in the first chapter of this work.

About this time William Penn came, and recognizing the importance of the fisheries, one of the first stipulations he made with the Delaware Indians at a council held in the forest, was that he and his colonists should have the right to fish in the River Schuylkill. Whatever may have been the amount of fishing in the lower Delaware in the early days of the colony, it appears certain that as much attention was not given it as might have been until the middle of the eighteenth century. Previous to that period the trade in Philadelphia seemed no more than sufficient to support those who sold at the shambles east and west of the court house at Second and Market streets. In 1764, however, a fish market was erected, but even then for some time, it is said, not many fish were sold except in cool weather.

In the upper waters of the Delaware the earliest shad fisheries seem to have been established somewhere about 1751, and presumably was known as the Point fishery, and was a "day" fishery. That is, contrary to the usual custom, no hauls were made at night. When it ceased to be a fishery is not known positively, but was certainly still in existence in 1815, for among some old papers found bearing that date was one which conveyed a single share, or one-fifteenth interest in the Point fishery. This deed recites three transfers, beginning with one Roger Clark.

Shortly after this there was another fishery established, which belonged to Benjamin Van Crampen, and it was, according to Mr. L. W. Brodhead, of Delaware Water Gap, on "the shore of a tract of land formerly Ryerons (Ryersons), in the township of Walpack, Sussex county, New Jersey." The place is now known as Shoemaker's Ferry, and is five miles above the Delaware Water Gap. The fishery of Van Crampen joined "the land of Robert Hooper and others in tenure and occupancy of William Coolbaugh," and the place for drawing the net was downward from the mouth of Duncan's creek. In 1787 Van Crampen leased the fishery to James Brooks, William Coolbaugh, Cornelius Brooks, John Van Crampen, Cornelius Depue and Daniel Labar, Jr., for a period of ninety-nine years for the consideration of twelve shad a year. Thus it will be seen that Benjamin held his rights at slight value.

Whether the lessees of this fishery used seines, is not stated, but there is a possibility that they did not, but practiced the favorite method of the Indians of driving the fish into pens. This possibility is based on the following letter written by an old resident of Port Deposit, New York.

"In my youth immense numbers of shad came up the Delaware every spring to and above this place on the west or main branch of the Delaware, and shad fishing was a regular business among the early settlers, furnishing an abundant supply of food. About the first of June some ten or a dozen neighbors would assemble and selecting a suitable place would construct a large pen or wire near the shore, with an opening for the fish to enter. From this a brush wing or dam was extended diagnally up and across the river to the opposite shore. They then went up the river some two miles or more and constructed what they term a 'brush seive,' composed of limbs of trees with the leaves adhering and reaching from shore to shore. The branches were bound together with withes. The men were then placed at regular intervals in the water, pushing the brush seine and driving the shad before them into the pen below. In this way many hundreds and sometimes thousands were secured. The same process would be repeated below, forcing the shad up the river to an opening made in the opposite side of the pen."

About what time seines came into general use on the upper Delaware

is not known positively by the writer, but seemingly it was not much before the beginning of the present century.

Apropos of the use of nets, Mr. William C. Crawford, of Matamoras, in a communication to the Milford *Dispatch*, of November 5, 1891, relates the following method adopted in his early days at the "Yankee" fishery about 1826 and later: "During these years," he says, "* * * * the fishing was done in the daytime and thousands were taken at a haul. The fishermen's nets (with ropes) reached across the river where they started, a half a mile below where the Millford bridge now stands. The men on each shore walked down, and a canoe that would hold five men, four to pole and one to hold the rope, was at each end, with smaller canoes to watch for hitches, and when opposite the point of the Minisink island the canoes left the shore and met on the point of the island. A haul over this fishery swept over what has been called the Yankee, Crooked Billet, Cabin, Streak and Barn fisheries, and covered about one and a half miles."

From the earliest date of the establishment of the fisheries on the Delaware to the present time, those engaging in that work above Easton, with scarcely an exception, fish at night, while below take advantage of the daylight as well to work their nets. The fishermen of the upper Delaware give as a reason for this comparatively exclusive night work, that the habit of the shad is to run more freely during darkness and keep quiet in the deep pools and eddies through the daylight, and there seems to be force in this reasoning.

In the use of the net in the upper waters of the Delaware also, it is necessary to use very short dobber lines or generally none at all, for as soon as the shad gets out of the deep water it rises nearer the surface relatively than far down the river. Far up the river it is no uncommon sight to see hundreds of shad making their way upward with their backs frequently showing above the surface. Besides of this tendency of the shad to break water in the upper Delaware, there is another reason, not only for the abandonment of the dobber lines, but for much shallower nets than the south Delaware fishermen employ. This is, that the water is for the most part only from five to six feet in depth, though occasionally there are fisheries where the river has a depth of ten feet or so and boats must be used.

The early fishermen of the upper Delaware adopted the same method of dividing the fish caught as those of the early days of the Commonwealth on the Susquehanna, and it is worthy of note that the peculiar custom is still in vogue.

Mr. Alexander A. Larzelere, formerly a resident of Burlington, New Jersey, now Frankford, Philadelphia, in speaking of the shad fisheries of the Delaware many years ago, says: "There was in 1806 at Moore's Point, or Biles Creek, Pa., above Perewig island, a large fishery owned by the Moore family. The current of the river is very strong here and

the lines of the net were drawn by a horse at full speed to where the windlass is, which is worked by men when the net is drawn ashore. This has always been a good fishery and is still operated by the Moore family.

"At Starve Out, Pa., opposite White Hill, is another fishery of note. This was fished by Daniel Williams in 1833, which season was considered a remarkable one. On the third of May, in that year, there was caught by Mr. Williams 581 shad at a single haul, and two days later he caught 642. At the Dutch Island fishery, just above, on the same day were caught 2,440 shad at one haul.

Betley's Point was fished by Daniel Williams in 1811, and from that period for eight years in succession he worked so successfully that he cleared regularly about $1,000 a year. He also fished the place again in 1835, but with poor success. It is stated as a remarkable fact, in connection with this fishery, that about the year 1809 thirteen water hauls were there made in succession, but on the fourteenth haul 1,800 shad were captured.

"Ivins' fishery in Pennsylvania, opposite Kenkara, N. J., is an old fishery and has been fished since about 1850 by Barkley Ivins and his relatives with generally good success.

"Cash Point, on the same side of the river, opposite Florence, N. J., has been since 1883 and still is fished by Daniel English.

"Tullytown creek, or Hadley's, Pa., in 1833, was fished by William Vandegrift and Daniel Vansciver, and is considered one of the principal fisheries in above Philadelphia and below Trenton. On the first of May, 1833, 30,000 shad were taken.

"Upper Dutch Neck fishery was owned from 1812 to 1821 by Daniel Williams, and was at that time a profitable fishery, though it is now abandoned.

"Lower Dutch Neck, another place was from 1810 to about 1834, owned by Michael Hays, and was good paying fishery and is still fished. In the year 1814, 1,500 shad were taken at this place in one haul. For some years past this fishery has been operated by Samuel Estelow and Eliza Brown.

"The Burlington or Matinnakunk island fishery opposite Bristol, was operated by Daniel Williams and Mathew Vorce, in 1820. In that year, more than 1,000 shad were taken here every day for eight days in succession. Daniel Vansciver, William Vandegrift and Joseph C. Deacon also leased and operated the fishery in later years.

"The Northwest front of Burlington Island was fished by Daniel Vanscier and William Vandegrift about the same period, and in 1853 by John Smith, though the fishery was esteemed as of little account. It has been abandoned for some years.

"Badgers island, Pa., opposite Burlington, in 1812, was fished by Benjamin Shepherd and a Mr. Turner, and captured large numbers of

fish. About 1829, Charles Vansciver leased the place and fished it for twenty-two years. In the season of 1853, 2,100 shad were caught at this fishery on the first day of April, and 54,000 were caught during the entire season, and one of these shad weighed $13\frac{3}{4}$ pounds. It was purchased by Christian Larzelere, Esq., a judge in Burlington county. After Mr. Vansciver retired, the fishery was conducted by Daniel Dwire, and after his death by his sons, now residents of Kensington. This fishery is considered the very best on the Delaware above Gloucester. At this fishery in 1807, a striped bass, or such fish was caught that weighed 76 pounds. It had scales about the size of a Spanish quarter dollar. This huge fish created much excitement in the neighborhood, and many people came to see it. It was finally bought by Samuel R. Gummire, the principal of an Academy for Young Men.

"Dunk's Ferry, at Beverly, was a shad fishery previous to 1840, and during the months of July and August was renowned as a sturgeon fishery, but of late years the fishermen in the Delaware by the number and immense size of their nets, made sturgeon fishing in the river unprofitable.

"At Troy Town, above Andalusia, the river is very deep; in many places it is said to be more than seventy feet. As a result the shad fisheries there are hard to work. The herring fisheries, however, is reputed to be excellent.

"Hawk's Island, at the mouth of Rancocas creek, was fished from 1826 to 1829 by Daniel Williams and afterwards by John W. Fennimore, a relative of Fennimore Cooper, the celebrated novelist, Joseph Adams, Peter K. Heisler. For years this fishery was noted for its large shad, but the place is abandoned now."

TROUT PONDS, ALLENTOWN OR EASTERN HATCHERY

CHAPTER IV.

Early Fisheries of the Schuylkill.

Not less beautiful in scenic effects than the Delaware is its greatest tributory, the River Schuylkill, named by the early Dutch settlers from the windings and hidden character of the stream. Near Philadelphia this river and its surroundings bear a remarkable resemblance to the River Rhine. A few miles above, the river dividing winds its arms like huge silver serpents in and out among mountains and hills wild and grand.

The Schuylkill was once a famous shad river; William Penn in one of his letters mentioned that "six hundred shad had been taken with one sweep of the seine." But now, through dams and pollution, its glory in this respect has departed, and since 1830, as far as known, not a fish of this species has returned in its waters.

On the banks of this river was founded, in 1732, the "Schuylkill Fishing Company of the State in Schuylkill," one of those institutions for which Philadelphia is at once famous and peculiar. This organization flourishes to-day as vigorously as it did one hundred and sixty years ago, although its quarters have been moved from its original location. For years the society occupied a building on the slope of Warner's Hill, paying an annual rental to William Warner, the owner of the land, of three fresh sunfish. Still another famous fishing club of pre-revolutionary times was that of old Fort St. Davids, where Falls of Schuylkill now is. This organization, which was composed of many notable men, after the war for independence, was merged into that of the State in Schuylkill.

Mr. Samuel W. Pennypacher, one of the most eminent antiquarians in the state, has been at much trouble in rescuing from oblivion the early fisheries of the Schuylkill, and has embodied the results of his researches in a deeply interesting work entitled "Phœnixville and Vicinity." Of the fisheries, Mr. Pennypacher says, "that in the early part of the last century every Spring, the shad came up the Schuylkill in immense numbers, and the inhabitants along its banks engaging *en masse* in fishing, secured enough to furnish their families with this article of food until the next annual return. The earliest place for fishing now known was at the Long Ford, opposite Port Providence. The pond there constructed belonged in common to the dwellers upon both shores of the river, and they united their forces in the pursuit and divided the spoils after the capture. A wall, in the form of a segment

of a circle, and answering as a pen into which the fish could be driven, was built in the middle of the stream with an entrance towards its source. From the edges of this opening, racks were stretched obliquely to each shore, and were secured in their positions by being tied with withes to stakes which were driven into the ground at the bottom of the river. A rope of grape vines and bushes, long enough to reach from one shore to the other, was made, usually at the mouth of Mingo creek, about five miles above, and when it was completed the fishermen started in canoes to sweep the river. By this means the shad were forced into the pen, and were there caught with a small net. Whole days were devoted to the work, sometimes as many as forty men were engaged in it, and John Shaw, who was a person of veracity and had frequently assisted, when an aged man told Moses Robinson that he had seen eight thousand five hundred shad driven in the pound at one time. The fishermen who were present when this assertion was made accredited the statement.

"Another method of fishing was afterward adopted. Racks extending from shore to shore were placed in the stream with their bars so close together that the fish could not pass, and a pool or basin was cleared away below. The shad ascending the river, to deposit their spawn, crowded against the racks in such numbers as sometimes to push each other out of the water, and a pole could not be thrust to the bottom without displacing them. As many were taken as were wanted, and the rest struggled in unsuccessful efforts to escape the impediment. This plan, though effectual, was very wasteful and destructive, and awakened the angry opposition of those who lived further up the river. In fact, these fisheries, from their commencement, were the source of continual jealousies and disputes, and their regulation was the subject of much early legislation.

"In May, 1724, a bill was passed for 'demolishing and removing Fishing Dams, Wears and Kedles set across the River Schuylkill' and was followed on the 15th of August, 1730, by an act to 'prevent the Erecting of Wears, Dams, &c., within the Schuylkill.' The effect of these enactments was, however evaded, and among the Archives of 1732 is found the following deposition: 'Marcus Huling Saith That as he was going down the Schuylkill with a Canoe Loaded with wheat, that striking on a fish dam, she took in a great deal of water into ye wheat, by means whereof his wheat was much damnified, and that it was in great danger of being all lost; and that at another time he stroke fast on a fish dam, and should have lost his whole Load of wheat, if he had not leaped into ye river and with hard Labour prevented ye Canoe from Swinging round, and so Suffered very much in his body by reason of ye water & cold; and that at another time he stroke fast on one of ye Rock dams & with great hazard and hard Labor escaped with his Life & Load.

"Jonas Jones Saith That in ye month of February, it being Extream Cold, he stroke fast on a fish Dam, and to save his Load of wheat was obliged to leap into ye River to ye middle of his body and with all his Labour and Skill could not get off in less than half an hour, afterwards proceeding on his journey with ye said wet clothes they were frozen stiff on his back, by means whereof he underwent a great deal of misery.

"Jacob Warren Saith That he with a Canoe loaded with wheat stroke fast on a dam, where he with his partner were forced into ye River, and one with all his might was oblieged to hold ye Canoe whilest ye other digged away ye stones of ye Dam, and with much difficulty got off.

"Isaac Smally Saith That going down ye said River with 140 bus. of wheat in a Canoe, they stroke fast on a Rack Dam and in order to save ye Load from being all lost, he was much against his mind oblieged to leap into the River, the water being to his Chin frequently dashed into his mouth, where between whiles he breathed, and both he and his partner held ye Canoe with great labour; whiles a young man there present ran above a mile to call help to get off.

"Walter Campbell Saith That he hath stroke fast many times on ye fish dams with his Canoe Loaded with wheat, and been forced to leap into ye River before he could get off.

"Jonas Yeokam and Richard Dunklin say, That they got fast on a fish dam with their Canoe loaded with 60 bus. of wheat & ye s'd Kunklin's Wife and a Young Child in ye Canoe, and were for more than an hour in great danger of being oversett into ye River, where if they had, undoubtedly ye Woman & Child would have been lost.

"Barnabas Rhoades Saith That he stoke fast on a fish dam in Schuylkill for several hours in ye Cold winter Season, destitute of any help, in which time he underwent a great deal of hardships and at last gott off, during all which time he was in great danger both of his life and Load. And that he has at divers times been fast on ye said Dams and in great danger.

"George Boone, John Boone, Joseph Boone, James Boone, Samuel Boone, Say that they have been sundry times fast on ye said Fish Dams and Rack Dams, and to preserve the Loads of wheat have been forced several times to leap into ye River, and have very narrowly Escaped with their lives & Loads."

"In consequence of these and other representations, an act was passed, in 1734, of similar purport with the preceding. In 1735, petitions were presented by both parties, without any change of legislation; but in 1736, those who were in favor of the weirs and dams succeeded in getting the Legislature to give them the privilege of erecting their racks in April and May, during the fishing season. This ought, perhaps, to have obviated the objections of the poor fellows who underwent so much misery from being compelled to leap into the river in the

midst of winter, but it did not meet with the approbation of the Governor and council, and was the cause of some dissension between them and the Legislature. The bill was returned by the Governor with the objection that, instead of being an amendment to previous acts, as it purported to be, it was in reality a repeal.

"The assembly endeavored to remove his opposition to it and he replied in a message in which the whole subject is reviewed. He said that the policy of the proprieter hath always been against the erection of the dams and weirs, because they were an obstruction to navigation, and that the racks were worse than the weirs, for while the latter were only made of light sticks the former were constructed of more substantial material, like horse-racks, and were sustained in their places by large stones carried into the river to support them. A more serious objection was the threatened destruction of the fish. The practice followed by those who fished with racks in the Schuylkill was the most ruinous that could possibly be contrived.

"'This Practice is for Great Numbers of People mostly on Horseback for a mile or two or more, with large Bushes, Stakes or other Instruments that may best answer the End, to beat the water with great Noise, rake the Bottom of the River above the Racks and, to take all the methods in their Power to force the Fish down nto the Racks; and if this was the Practice heretofore, now when half the River is to be left open it will follow of course that others in and about the vacant Part must use equal or greater Industry to prevent their getting that way by the Racks, by which means those that can escape must be more frightened and disturbed, the Spawn by the treading of Horses or other Feet, and by raking with Bushes and Trees must be destroyed.'

"Not only were the people residing on the upper part of the river deprived of that to which they had an equal right with the other settlers, but it would result in the extermination of the fish, and the inhabitants and their posterity would be robbed of this great source of benefit and profit. He also gave as an objection the moral consideration that the erection of racks was attended with 'tumultuous Meetings, riotous Behaviour, Quarrels, Contentions and even Outrages amongst the Young People and others who assemble as to a Merry-making or a publick Diversion, at the time of fishing by Racks, which are so unseemly Returns for the benefits conferred.'

"The opponents of dams and weirs succeeded in preventing the act from becoming a law, but their views were not enforced without resistance. The fishermen of Long Ford were too stout hearted and too tenacious of the privilege they had for years enjoyed to yield without a struggle, and the use of the racks was continued despite of the legislators.

"Finally, in 1738, their exasperated adversaries up the river organized a force of volunteers, as formidable from the numbers and courage of its constituents as possible, collected a fleet of canoes, and under the com-

mand of Timothy Miller, a man of great muscular strength, set sail on the 20th of April, intent upon desperate deeds, and in the full anticipation of success. Arriving at Long Ford they commenced a work of havoc among the racks, which they broke away from the moorings and sent adrift down the stream. A few of the fishermen, who chanced to be there when the fleet appeared, at first attempted with soft words to stay the destruction which was being committed, and, finding prayers and entreaties ineffectual, seized upon the loosened racks and endeavored to carry them away.

"This did not suit the purpose of the assailants, who pursued and relentlessly dragging the implements from their grasp broke and cut them into pieces. It was more than could be endured. Abandoning temporarily the disputed ground, they fled into the settlement, sounded the slogan and summoned to the rescue every man who could handle an oar or wield a club. Thus reinforced they returned to the encounter, and in their canoes made a furious assault upon the fleet of the enemy, which still unwisely lingered about the scene of demolition. The struggle that ensued, whose issue perchance depended more upon individual strength than skillful manœuvering, became desperate, and for a long time Mars or Neptune whichever we may suppose to have been the presiding divinity, maintained the utmost impartiality. The scale was finally turned by the valor of Thomas Valentine, the tenant at the Knoll, who leaped into the canoe of the opposing commodore, Timothy Miller, struck out lustly upon all sides with a club, and after beating down every man of its crew succeeded in effecting its capture.

"This serious loss dampened the ardor of the assailants, and Miller, his thumb broken and his companions overpowered, was compelled to order a retreat. Encouraged by the unexpected advantage, the victors pressed their antagonists closely and the retreat soon become a route. The beaten squandron fled rapidly down the Schuylkill, and in order to escape their pursuers, who followed with the utmost pertinacity, made the grave mistake of entering the Perkiomen.

"This stream was too shallow for navigation, and the canoes soon running aground, the crews were compelled to seek the shelter of the forests for safety. A complete destruction of the boats and their contents satisfied the vindictive ire of the fishermen, who returned to their homes elated with a triumph which had been dearly purchased with many severe wounds and the loss of their racks.

"This is the description of what was perhaps the only Naval battle ever fought upon the Schuylkill, as it has been handed down to us by those who participated in it on the side of the victors. The story of their opponents was detailed at the time as follows:

"William Richards, Constable of the Townships of Amity, in the County of Philadelphia, makes oath, That on the twentieth day of this Instant April, he received a Warrant from George Boon, Esq., one of

his Majesties Justices of the Peace of the said County requiring him, this Deponent, to take to his Assistance such persons as this Deponent should think proper, & go down the River Schuylkill & remove all such obstructions as should be found in the said River, in obedience to which Warrant this Deponent took several persons, Inhabitants of the s'd County as his assistants, & together with one Robert Smith, Constable of the Township of Only, who had received a warrant to the same purpose, went down the said River in three Canoes to Mingo Creek where they found a Large Number of Racks & obstructions in the said River, & saw four men upon an Island near the said Racks, that this Deponent & Company removed the s'd Racks without receiving any opposition, from thence they proceeded down the River to the Mouth of Pickering's Creek, near which they found several Racks, which Reacht Across the s'd River to an Island, which Racks this Depon't & Company also removed, that immediately after the s'd Racks were removed, about the Number of two hundred Men came down on both sides of the s'd River & were very Rude & Abusive & threatened this Depon't & his Company, that the s'd Depon't expecting from the ill Language and threats given that some mischief or a Quarrel would Ensue, he took his Staff in his hand & his Warrant & Commanded the s'd Men in the Kings Name to Keep the Peace & told them that he came there in a peacable Manner & according to Law to Move the Racks & Obstructions in the River, upon which some of the s'd Men Damn'd the Laws & the Law-makers & Curs'd this Deponent & his Assistants, That one James Starr Knockt this Deponent down in the River with a large Clubb or Stake after which several of the said Men Attacktd this Deponent & Company with large Clubbs & Knockt down the s'd Robert Smith, the Constable as also of several of this Deponent's Assistants that one John Wainwright, in company with this Deponent was Struck down with a Pole or Staff & lay as Dead with his Body on the Shoar & his ffeet in the River, That this Depon't & Company finding that they were not able to make Resistance, were Obliged to make their best of their Way in order to save their Lives, after which this Depon't, together with the Constable of Only & some of their Company, proceeded down the River, in order to go to Philadelphia, to make Complaint of the ill Usage they had received, that as they came near Parkyooman Creek they found another Sett of Racks, which were guarded by a great Number of Men, that this Depon't & Company, Requested the s'd Men to let them go down the River, & if they wou'd Suffer them to pass that they would not Meddle with their Racks, upon which the s'd Men abus'd & Cursed this Depon't in a very Gross Manner, telling the s'd Depon't & his Company that they should not pass by them, That one of the s'd Men called out aloud & offered ffive Pounds for Timothy Millers head, the s'd Timothy being one of the Depon'ts assistants & another of the s'd Men called out to the s'd Timothy to make haste away, And after-

ward the s'd Men pursued this Depon't & Company, who for fear of Murthered made the best of their way with their Canoes to the Mouth of Parkyooman Creek & there went ashore & left their Canoes there with several Cloaths, which Canoes are since Split in Pieces (as Reported) & several of the Cloaths turn'd adrift on the s'd River.

"The X mark of William Richards, sworn on the 27th day of April, 1738, Before me, Ras Assheton."

* * * * This difficulty was the cause of considerable agitation in the colony and resulted in the termination of rack fishing.

"* * * * After the racks had been removed from the Schuylkill, fishing enstead of being an occasional pursuit for the whole neighborhood, became a regular avocation, and was conducted by a few skilled persons, who gave their time and attention to it. Pools were cleared away in the River and the fish were hauled into the shore by means of seines.

"The Islands, since they contained the best landing places, grew to be very valuable. Four hundred shad were caught at Long Ford in a haul, which is the largest upon record. Twenty-three hundred were caught in one night at the Island opposite Phœnixville.

In 1820 "there were fisheries at Longaker's Pool, where the railroad now crosses the Schuylkill at the mouth of the tunnel, at Buckwalter's Pool, near Buckwalter's Island; at the mouth of the French Creek, at Long Ford, Green Hill, Perkiomen and Valley Forge. At Buckwalters in 1812, one hundred shad were caught in a seine at one time.

"When Samuel Lane owned the Bull Tavern, he had an arrangement with the fishermen at the mouth of the Pickering, that he was to furnish them each morning with a quart of whiskey, and they were to give him in return a shad weighing eight pounds. The contract was continued for some years with mutual satisfaction. After a time, however, shad deteriorated so much in quality that those of that weight became extremely rare. Finally, one morning the fisherman saw 'Old Sammy' coming along as usual with his quart jug, and, on looking over their captures, no fish of the requisite proportions could be found. In this unfortunate emergency a happy thought occurred to one of them, and, seizing the largest of the fish, he held its mouth open while a comrade filled in pebbles enough to give it the proper weight. The old man carried it off to his home, saying it was a heavy fellow, but the whiskey contract was afterward abandoned."

One of the most valuable of the shad fisheries on the Schuylkill, near Philadelphia, was at Manayunk. Before the beginning of the present century there had been made in the river, from time to time, a succession of rude dams from one to three feet high. These dams extended only a portion of the way across the river and were intended merely to force the water into a particular channel. Between the island at Manayunk and the western shore was one of these dams, forcing the water into a

narrow channel on the eastern side. The fishermen at this fishery used to station their boats with their seine at the head of the island and a man at the lower end to watch the schools of shad coming up, and when he saw them he would give the signal to the party in the boat, who immediately ran out with the seine, going downward.

Some of the old residents along the Schuylkill river near Philadelphia, relate marvelous tales of the catches of fish to be made in their boyhood days, and some of them almost surpass belief. One of these who spoke in a more moderate strain was Godfrey Schrout, a one-time resident of the falls of Schuylkill. He related to a friend about seventy years ago, that, in his younger days he could often catch with his dip-net 3,000 catfish in one night; the perch and rockfish were numerous and large. Often he has caught 30 to 80 pounds of a morning with the hook and line. Other persons who were neighbors of Mr. Schrout asserted that there was nothing extraordinary in a catch of 3,000 catfish in one night in a dip-net. Up to the year 1817, they say, more than that number were taken repeatedly in the same period of time. It has been claimed that so plentiful were this species of fish, that one scoop of the dip-net has brought up more catfish than could be lifted into the boat by one man. There were said to have been people at the falls in those days, who, in the fishing season which lasted some three months, made enough by catching shad in a simple scoop or dip-net to support their families in fish for a whole year. In their work they anchored or fastened to the rocks in the rapids, the small boats from which they fished; some of the particular stations were more valuable than others, and there was much rivalship in the early spring who should first get possession of the favored spots, which the boat never left during the whole season; if it did, by a rule among themselves, any one else was at liberty to take possession.

The catfish were the kind known as the white catfish, a migrating species that came from the sea annually in immense numbers, so numerous in some instances as to blacken the narrow passages of the river. They came regularly on or about May 25, the run lasting some two or three weeks. They were caught in immense numbers during the season, put in artificial ponds made for the purpose, and taken out as wanted during the summer and fall months. They were delicious eating and the people thereabouts learned the art of cooking them so well that thousands of people were attracted thither, and the fame of the Schuylkill's catfish, waffles and coffee became of more than local fame.

CHAPTER V.

The Decline of the River Fisheries.

The residents along the Schuylkill were not allowed a lengthy time in which to enjoy their well-earned victory over the rack fishermen. Other influences were at work which were to utterly ruin their fisheries. On March 8, 1815, the Schuylkill Navigation Company was incorporated, and that concern immediately began the erection of two huge dams across the Schuylkill, one at Flatrock, now Shawmont, and the other at Reading, and had them completed by the latter part of 1818. A few years later the city of Philadelphia constructed a third dam at Fairmount for water supply purposes. As a result the migratory food fisheries above this last mentioned dam were immediately ruined. The fishing below Fairmount was still good, however, for a few years, then the gas works were built, and the refuse which was emptied into the river drove the food fishes even from the still open part of the Schuylkill.

In the meantime so great was the feeling engendered among the people against the Schuylkill Navigation Company for the part it took in the destruction of the fisheries, as well as for other arbitrary acts, that every opportunity was seized for reprisals. For a long time whenever a suit for damages came before a court jury in which the company was involved as defendant, it was pretty certain to be heavily mulcted.

About the same time, also, the fisheries in the Lehigh river were destroyed by a dam built near the point at which it discharges into the Delaware. Almost contemporaneously with this a dam was built at Lackawaxon, on the Delaware itself. Fortunately this, while it greatly obstructed the passage of the shad to their spawning grounds, was yet low enough to allow this fish to surmount the obstacle whenever the water was high. Nevertheless, while this was the case, shad were scarce above in the river after the erection of the Lackawaxon dam, as compared to the years before it was built when the fish had free passage to within thirty miles of the headwaters in New York State.

At various times since the erection of the Lackawaxon dam efforts have been made by citizens of New Jersey to have built similar affairs at other points, for water supply purposes, and acts to permit the erection of such have, from time to time, been passed by the legislature of that state. Fortunately these acts have all failed through the necessary concurrent legislation in Pennsylvania.

Worse than the dams, so far as fish life is concerned, were the fish

traps and the outrageous methods adopted by many of the people in the upper reaches of the Delaware to secure their prey. For miles above Trenton fish baskets were set one above the other until the wonder was how a single fish managed to escape.

But fatal as these fish traps were to the continuance of the fishing industry by the impossibility of more than a small percentage of the mature fish escaping to the spawning grounds, they were far more so to the young shad on their way in the fall of the year from the upper reaches of the river to the sea. So delicate is the structure of the young shad that the loss of even a few scales means death. Into the fish baskets nearly every young shad was forced to go, and thousands upon thousands annually perished there. As many as fifty thousand dead young shad, it is said, have been taken from one of these fish baskets at a time, and it is estimated that as many more fish of those that succeeded in passing through the slats died through injury to their delicate bodies. Mr. Howard Reeder, who was at the head of the State Fish Commission in 1874, in making his report, speaks as follows concerning fish baskets and traps:

"Of all implements for the wanton destruction of fishes which have ever been constructed by human skill, the one most worthy of condemnation is the ordinary fish basket. These instruments of extirpation are placed in the midchannel of the river, with long arms or wings made of stones, extending upon either side towards the shores. Every living creature carried by the current is swept into these baskets. Young shad are particularly delicate. A blow which displaces a scale will result in the death of the fish, so that scarcely a young shad which succeeds in going through the slats of the basket will live, while millions are stopped upon the basket and there allowed to die. Instances have come to our knowledge where, in 1870 and 1871, parties owning baskets were obliged to shovel out with a wooden scoop the young shad that had accumulated in their baskets in less time than one night. In one instance the owner of the basket said that he thought in one night he had thrown from his fish basket *more than a cart load of young shad.* It is not probable that one survived.

"* * * * * As an engine used for the destruction of fish, the set-net or fike-net is surpassed only by the fish basket. This net is an elongated trap with a large mouth set directly in the current of the stream, sometimes with long arms or wings of stone extending out similar to the fish-basket, turning the entire current through the net and sweeping into it every living creature carried by the current. These nets require no attention and no labor. They are simply deposited and left to take care of themselves until the owner is ready to take them up and empty them of their catch. Occasionally along our large rivers you will find a man owning as high as thirty or forty of these nets."

The bush seines, eel weirs, and the like, also, were the means of destroying thousands more of shad. So great was this slaughter from the upper stretches of the river to tide water, that at Milford they almost entirely disappeared, and in 1872 the fisheries at that place yielded only a single shad, where about the beginning of the century the annual catches had run into the thousands.

All along the Delaware the fishing fell off, until in 1873 the fisheries failed to pay expenses, the total yield being the year previous but $81,000. Of one fishery belonging to the Howell family of Woodbury, New Jersey, a record of catches has been kept for more than a century and a half. From that record it appears that prior to 1825 the average annual returns were about 130,000; from 1845 to 1849, the average fell to 66,890; from 1866 to 1869, the average catches were 60,739; from 1870 to 1873 the yearly average was less than 25,000.

A company composed of Mr. B. Wilkins and two partners carried to market and sold the product of sixty-three nets for about thirteen years prior to 1840. From Mr. Wilkins' statements it appears that in 1870 and 1871 no single gilling-net approached in the number of its catch to the quantity formerly obtained, though the length of the nets had been greatly increased. He instances the case of one gilling seine of 200 fathoms, in the vicinity of Fort Delaware, as having taken, while he was carrying for its owner, 850 shad in one drift; and says that at no time for five years previous to 1870 were over 200 taken in the same time, and 100 perhaps would be a high average.

Not only did the number of fish caught fall off thus rapidly in the Delaware year by year, but their size appreciably decreased. In 1843 shad of seven and eight pounds in weight were by no means uncommon, and the average run was between five and five and a half pounds; but in 1873, and for many years before, a four pound fish was a curiosity. The writer remembers well in 1879 capturing in a net at Bay Side a shad weighing eight and one-half pounds. On bringing it to shore, from its size, it attracted the fishermen of the place, and at their request, was hung upon the wall of a building on the wharf and attracted fishermen from along the shore for several miles above and below. In 1843 and thereabouts forty shad usually filled a pork barrel; in 1873 it required over one hundred to occupy the same space.

The story of the devastation of the fisheries on the Susquehanna is equally a gloomy one. Although fish weirs and baskets and other deadly devices were practiced for the capture of shad from the earliest coming of the whites, yet the river yielded enormous returns until about 1830. Then the Columbian dam, which belonged to the Tide Water Canal Company, was erected. Other dams were afterwards put up above and below this as feeders to the canals along the Susquehanna.

Some years after the one below Columbia, called the Safe Harbor dam, was carried away by a flood and was not rebuilt. These dams, unlike

the one at Lackawaxen, completely destroyed the shad-fishing industrie above them. It is true that the Tide Water Canal Company were bound to keep an open passage for fish in its dam, but for many years they failed to carry out this portion of their duty.

After the erection of the Columbian dam, the people who dwelt below seemed to think that the future of the shad fishing industry in the Susquehanna was about at an end, for they threw all discretion to the winds, and adopted all kinds of outrageous methods of taking fish. The river for miles and miles below the dam is studded with innumerable rocks in every form of grouping. Many of these rocks occur in twins, with a small space between them, through which the water washes, "and," says Commissioner James Worrall in his report for 1870, "there is no care of the kind which has been neglected by the kiddlers. Between these twin rocks a fish basket is certain to be found." As a natural result of such work in 1870 there were not five shad caught where there were a hundred in earlier times.

It is well known that shad on their way from the sea will make almost preternatural efforts to reach the grounds on which they were spawned, there to deposit their spawn in turn. The story told by an old gentleman, therefore, of a sight he witnessed at the base of one of these dams has much of pathos in it. Thousands upon thousands of fish, he said, were in the pools, darting hither and thither in frantic efforts to pass the barrier, sometimes great numbers of them, their silver sides glittering through the water, could be seen following along the base of the dam in vain hopes of finding an opening.

On such occasions as this the fisherman was in his glory. Alvan Dane, an old gentleman now living at Kansas City, but formerly a resident on the banks of the North Branch of the Susquehanna, says that when the Nanticoke dam was built the shad could not come above it, and men were in the habit of fishing there with a three pronged hook, sinker, and stout line and pole. This was sunk, and after a few minutes quickly jerked up. "I caught two in that way; others had better luck, and it was reported that one man caught seventy in one day; but I think a large reduction would come nearer the truth."

While the great shad industry in the Susquehanna, Delaware and their tributaries was being thus ruthlessly destroyed by dams, fish-baskets, traps and other iniquitous contrivances, the mountain and other streams and the mountain lakes were being as wantonly depleted of other food fishes just as rapidly. Wherever there was a body of water that contained trout, pickerel, catfish, or in fact any member of the finny tribe worth having, there were to be found people using the most detestable methods for their capture. Every mountain stream contained numberless fish baskets, set lines were zigzagged from bank to bank, and under the over-hanging bushes. Not only were seines used to sweep the pools, but lime, *cocculus indicus*, and other deleterious

substances also. In the natural ponds or lakes, besides all these things, pike nets, dynamite, and other explosives were used, and excessive ice fishing was indulged in. In this last particular the writer saw recorded, as a matter to take pride in, in a registry book of a backwoods hotel in Pike county, that a party of five, whose names were given, had in one winter's work in the early "seventies," caught from one pond more than seven hundred pickerel; and the same book showed that during the same winter more than three thousand pickerel had been taken from that body of water. It was no wonder that in the season of 1891, less than one hundred of that species of fish were caught in those waters.

But worse even than fish baskets, dynamite, deleterious substances and unfair fishing, because farther reaching, was another element—stream pollution. Saw mills were erected in the backwoods on the banks of trout streams and the sawdust dumped into the water. By this means millions of fish were killed. Within the coal bearing area mines were opened and the filthy culm, composed of carbon and clay, emptied into the water; and thereafter pure sparkling streams, richly populated by mountain trout, were emptied of their fish, and ran, black, filthy and malodorous, to the rivers, which thereby became befouled, and, in many cases, almost absolutely fishless. Two notable examples of this lamentable result may be named—the Lehigh river and the upper waters of the Schuylkill.

CHAPTER VI.

Work of Restoring the Shad Rivers.

This was briefly the condition of affairs in Pennsylvania about the close of the Civil War: One dam impeded the passage of shad in the Delaware, and others near the mouths of the Schuylkill and Lehigh and on the Susquehanna prevented this food fish from ascending the waters at all. Through these obstructions, destructive fishing and water pollution, the shad fisheries of the Schuylkill and Lehigh were utterly destroyed, the Susquehanna nearly so, and those of the Delaware were run at a loss. The mountain lakes were in a bad condition, and the trout streams generally were either utterly ruined or yielded poor returns. Pennsylvania was not alone in this deplorable situation. The waters of the other Middle States and the New England States were little, if any, better. General alarm was felt, and Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York and Pennsylvania appointed, through the respective legislatures, commissioners to investigate the extent of the trouble and report on the best method of restoring the fishing interests. Pennsylvania's commissioner was Mr. James Worrall, of Harrisburg. His appointment was the result of a convention held in Harrisburg in the early part of 1866. At this convention a law based on a Massachusetts enactment of the year previous was drawn with great care and passed promptly by the legislature, then in session, and signed by the Governor on March 30. This law, after reciting that by the construction of a dam across the Susquehanna shad, salmon and other fish were prevented from passing up the said stream to the great detriment and injury of persons and communities along said river, provided that the several companies owning or interested in dams on the Susquehanna, or in the North or West branches of the same, between tidewater and Wilkes-Barre on the West Branch, should, within six months from the passage of the act, erect such under-gates, sluices, chutes, or other devices in all dams as would permit the free passage of shad, salmon and other fish up said streams.

A second section of the law provided that, if the owners of said dams neglected or refused to construct sluices as would allow the free passage of fish up the said river within six months after the passage of the act, they should be liable to a fine of two hundred dollars, to be recovered as debts of like amount are recoverable by law.

As soon as the act was passed and became a law, Mr. Worrall entered upon his duties and endeavored to enforce its provisions.

Finding that the Tide Water Canal Company was under obligation

to keep an open fish-way in the Columbia dam, Mr. Worrall notified that corporation to fulfill its obligation and met with a prompt and affirmative response, and an opening was immediately made in the dam by the company, at an expense of some five thousand dollars. With the other companies, however, Mr. Worrall met with opposition. These claimed that they had purchased the dams above the Columbia from the state free of incumbrance and that the act of the legislature was unconstitutional, as it infringed on their vested rights. On these grounds they either refused or neglected to comply with the demands made upon them. Suit was thereupon begun against the companies by the state and a long and bitter legal battle of nearly four years was waged. The court of quarter sessions of Dauphin county, where the cases were first tried, decided against the state, sustaining the plea of the companies that they were not compelled at their own expense to make these openings. The fight was then transferred to the supreme court; but that tribunal affirmed the opinion of the lower court.

According to Mr. Worrall, in his report for 1870, the result of the opening at Columbia, for the first two years, appeared to be a complete success. The year 1867 showed a catch reported from fifteen to twenty thousand in number, above that dam. In 1868, however, the catch fell off one-half and in 1869 and 1870 the catches did not exceed five thousand in each year. This great fall off in the catches Mr. Worrall attributed to various reasons: first, probably because even the highest number caught scattered over a distance of fifty miles was no temptation for the number of hands required to manage large seines; second, because it was too expensive to clean out the old fishing grounds for seining; third, because the kind of seines necessary for shad fishing on anything like a profitable scale were too expensive, and finally because the inducements were insufficient for fishing in the fifty mile reach above the Columbia dam.

The one fishway constructed was from a plan chiefly devised by the superintendent of the canal company with some modifications suggested by Mr. Worrall, and was placed about one-fourth of a mile from the York county shore. In its construction a section forty feet long was taken from the dam, in which a new sub-dam was erected, so that its highest elevation would about equal the level of the water below the dam. The lower slope of the sub-dam was placed at an inclination of one in fifteen, and the sides of the aperture in the main dam were dentated or framed in a series of offsets so as to promote the formation of eddies in the current passing over the sub-dam. Shad and other fish, in their endeavors to pass up, were expected to be under the influence of gravity in opposite directions, the lower water seeking to obtain its level, the top of the sub-dam, the other water rushing through the aperture would meet and drive it back with a force considerably impeded by the cushion, so to speak, of lower water. The fish were

expected to find this opening through which they would endeavor to pass up. If they failed in the first few trials they would naturally seek the eddies in the recesses at the sides of the sluices where they would gather strength for a new trial.

It was soon recognized that this fishway was a failure and abandoned, the weak point being that the fish met the greatest resistance at the top where they were expected to enter the dam, when they were in their most exhausted condition.

Notwithstanding this laudable effort on the part of the state to improve the fishing, residents on the Susquehanna, especially in the neighborhood of the Columbia dam, did all they could to make the work abortive by using every device, however unfair, which came in their way to catch shad. The legislature then passed a law, in 1868, making it unlawful to fish with any seine or by any other system of entrapping in numbers within two hundred yards of any sluice or other device erected for the passage of fish as described in the act, or upon or about any dam in or upon which such sluice shall have been erected.

"Yet," says Mr. Worrall in his report of 1870, "regularly as the spring comes round, there are dip nets worked by sweeps, like well sweeps, at every few rods, kept in operation perpetually during the whole twenty-four hours in front of the Columbia dam, rising out of and falling into the reacting water of the dam as it falls over its face. These dip nets are used for catching mullets, their very operation precluding the possibility of catching shad in them, for their intermittent motion has a tendency, nay is absolutely certain to scare away those timid fish from the face of the dam.

"Ten or a dozen such machines working night and day, in a row, in front of the dam and in its reaction water, at distances not more than six or eight rods apart, effectually stop the approach of the fish to the dam to seek a means of passing through it. It is well known that the shad upon reaching the dam rose along in front of it, in the reaction, seeking some opposing current against which it is their instinct to propel themselves. But interrupted as they are by this constant rising and falling of these great dip nets, ten or twelve feet square, the timid fish are baffled and driven away."

Nothwithstanding that this first effort to restore the Susquehanna fisheries was esteemed a failure, there were enough elements of success to afford encouragement to persevere. An act was therefore passed and signed, April 29, 1873, providing for the establishment of a fish commission of three persons, in order that the work of restoration might be the more systematically carried out. They were given extensive powers, and an appropriation. The three commissioners chosen under this act were Howard I. Reeder, Benjamin L. Hewit and James Duffy. They made a very careful study of the situation as it then existed and came to the conclusion that the deterioration was due principally to the fol-

lowing causes: (1) The practice of fishing with drift nets in the lower portions of the rivers. (2) The "close time," or the time during which fishing is forbidden in the rivers not being sufficiently long and not being observed. (3) The destruction of the young, when returning to the sea, by fish baskets.

The annual supply depends, of course, upon the ability of the shad to reach proper places for the deposit and hatching of their eggs. In their progress up the river they met net after net thrown across the channel for their capture. All the contrivances which man, their most destructive and unrelenting enemy, could devise, were placed to entrap them, and as a natural result very few of those which originally started from the sea reached their spawning grounds. The "close time" commenced at midnight on Saturday of each and every week during the fishing season and continued until midnight Sunday.

The first act of the commissioners was to endeavor to better the condition of the shad fisheries. They began operations on the Susquehanna which, at that time, were stated to be in rather a better condition than the Delaware, through the fact that about that period the Columbia dam had been partially destroyed by immense quantities of ice which were swept down the river by the winter and spring floods, and which formed in a huge gorge immediately upon the crest of the dam.

The efforts of the commission were first bent in having the deadly fish-baskets removed, but they met a serious legal difficulty at the very outset. They found that there was a peculiar construction of the law which required that ten days' notice be given by the sheriff before proceeding with a *posse comitatus* to destroy the basket. As a result the law requiring the removal of these wretched contrivances was rendered practically inoperative. The commissioners thereupon earnestly recommended that that part in the law requiring ten days' notice be stricken out, and that the passage of the law should be in itself sufficient notice, and that in addition to the required destruction of the baskets, an act imposing a penalty for the erection or maintenance of fish-baskets be passed. With this law upon the statute books the board believed that in another year they would be able to announce the entire removal of the destructive fish-baskets.

With the question of drift nets also the commission had long debate. While it was admitted that by this means more fish were captured than should be, yet this interest was too large and too valuable to be swept away by an encroachment, especially since the ground is often inaccessable to shore fishing and consequently the only means of fishing would be with a drift or gilling net. They, therefore, recommended a proper "close time" and that a strict observance of it be enforced. This they believed would be a great assistance in repairing the losses caused by these nets. The legislature subsequently adopted the recommendation of the commissioners, and wardens may now seize and destroy fish-

baskets immediately on being found. It was soon made manifest that the chief reliance in reviving the shad fisheries must be by artificial propagation. A few years previous Mr. Seth Green, the distinguished fish culturist of Rochester, New York, had invented and patented a convenient hatching box. Marvellous results, it was claimed, had been obtained in the rivers and other states by the use of this appliance. In the Connecticut river, where the fisheries were rapidly being abandoned on account of the scarcity of fish, the third year after these boxes were first used in the hatching, it is said, the catch exceeded that of any year in its history. The young shad returned mature fish to the rivers when three to four years old. Fisheries which had been in existence for nearly a century, and at which records of their annual catch were kept, reported their yield of 1870 as being larger than ever before. Referring to this result, the fish commissioners of Connecticut in their report of 1873 said:

"The number of shad running in the Connecticut river has increased to such an extent that the complaint of the fishermen is no longer a scarcity of fish; but that the market is so overstocked that they do not obtain a remunerative price for them."

The same desirable result was claimed by the use of these hatching boxes in the Hudson river; but not to so marked a degree, owing to a scarcity of good spawning grounds upon which to take the shad. Carefully considering what had been accomplished by artificial propagation, and believing that fully as much could be done for the shad streams of Pennsylvania, the commissioners of Pennsylvania felt justified in introducing them. They, therefore, entered into correspondence with Mr. Green, and speedily made arrangements with him by which they purchased from him the right to use his hatching boxes for three years in the State of Pennsylvania for the sum of $2,000 and soon after they were received.

The point of operation was established at Newport, in Perry county, at the fishery of Messrs. Miller and Kough, with Mr. Bhame one of Mr. Green's assistants in charge. From the beginning the work was prosecuted under great difficulties, the water at first too cold became suddenly overheated. Nevertheless Mr. Bhame succeeded in turning into the Susquehanna at Newport in 1873, 2,700,000 young shad. In addition to this, Mr. Whelcher, another assistant of Mr. Green and employed by Prof. Spencer Baird, the United States Fish Commissioner, who had been sent by the latter at the expense of the Pennsylvania commission, hatched and turned into the Susquehanna at Columbia and Marietta, about 500,000 young shad, making a total hatching for the first year of the new commission of a little over 3,000,000 shad. The same year also about a million fry of the same species hatched at Point Pleasant, Bucks county, by Dr. J. H. Clark, one of the fish commissioners of New Jersey were turned into the Delaware. In 1874, 3,065,000 were hatched for

the Susquehanna, but none for the Delaware owing to the fact that the Legislature of New Jersey failed to appropriate $3,000 for the work as Pennsylvania had done conditionally.

Besides their work in shad hatching the commissioners continued to struggle with the problem of perfect fishways and in the fall of 1873, completed one in the Columbia dam, which they believed would ultimately prove successful, and indeed for a time, while the water was high, it looked as though it would be, and it was in fact a great advance over anything that had preceded it. Its imperfections, however, are but put in the commissioners' own words: "We are firmly convinced," they said in their report for 1874, "that our fishway, as it stood in 1874, was operative in a high stage of water; we are just as firmly convinced that during a low stage our fishway was inoperative and inefficient."

To better this weakness alterations were made at an expense of some $4,000. But even these failed to give satisfactory results.

CHAPTER VII.

Work of Restoring the Shad Fisheries.

The condition of affairs in 1878 in the Susquehanna river was as follows: There were no new breaks in the Columbia dam by which shad could pass up the river. There were, however, first, the state fishway, about fifty feet wide, with a current through it about seven and three-quarter miles per hour, second, the old company fishway, forty feet wide at its mouth and twenty at its head, with a current about eight and one-half miles an hour, and third, the navigation chute, forty feet wide, with a current of from five to seven miles an hour through it, but much longer than either of the others. Besides these there were two old breaks, one within three hundred feet of the York county shore, and one within about one thousand feet of the same shore; the first was thirty-five feet wide, the other twenty feet across, and both extended to the bottom of the river. Through these openings numbers of shad passed, but not in satisfactory quantity, though doubtless more would have done so had it not been for the persistence with which the avaricious fishermen defied the law and cast their nets continuously before the lower opening, frightening the timid fish away. But as the commissioners at the time put it, "the average fisherman thinks that his right is one of the original inalienable rights of the Declaration of Independence, the greatest indeed of them all, and he respects no statute that impedes his operations."

Thus while the commissioners were doing their best to restore the shad fisheries, a large per centage of the people who lived along the streams were actively practicing that peculiar policy, the fundamental principle of which is that to secure the greatest number of eggs in the shortest space of time, kill the hens. No wonder there was a discouraging ring in the report of the commissioners of fisheries in the early days of their work, and that their cry year after year to the legislature, "abolish fishing within half a mile of the Columbia dam; increase the openings of the fish-ways; abolish the fish-baskets and punish the owners," was pathetic.

In 1879 the fish commission was enlarged by the addition of three members, John Hummell, of Selinsgrove; Robert Dalzel, of Pittsburg, and G. M. Miller, of Wilkes-Barre. The legislature at the same time authorized the commission to extend the experiment of fish-ways in the Columbia dam. Plans and proposals were therefore invited by advertisements in the Harrisburg papers and several were submitted on June 28, the day named, and models were ordered to be put in trial on

July 3. Four models on that day were set in a dam erected for the purpose in Paxtang, or Paxton creek, at Harrisburg, the competitors being H. S. Dimm, of Newport; S. M. Gross, of Shamokin dam; G. S. Burr, of Lewisburg, and Krause & Updegrove, of Harrisburg. Besides these, G. W. Parsons and Peter Fraley, of Columbia, each showed models in a second dam, and J. Krup, of Columbia, exhibited one farther down the stream. None of these models was accepted, however, but a modification of a plan submitted by C. E. Whitney, at one time a resident of Harrisburg, was tried.

This was simply an opening in the dam one hundred and twenty-five feet wide at the face of the dam—the dam itself turning two L's up stream and converging to within forty feet of each other, and being parallel at that width for about forty feet. At the inlet, however, the water was shoaled by a platform to the depth of five feet, which platform extended down stream about forty feet, where its level was about four feet above the smooth, rocky bottom of the river. This plan was chosen because it came nearest to the form of a break in the dam, and breaks appeared to have been the most successful fish-ways known up to that time.

The work was not disturbed by the ice in the winter of 1879 and 1880, but when the season of shad fishing came round, drawbacks to the success of the fish-ways showed themselves. The dam does not lie exactly at right angles to the current of the Susquehanna, so that in passing through the fish-way, the water sagged, as it were, somewhat to the left side. The shoaling platform extended some forty feet down stream from the mouth of the fish-way.

In front of it was deposited the débris from the old coffer dams, consisting of cinder, and this was covered by a pavement of solid stones, none weighing less than one hundred pounds and many heavier. The oblique course of the water disturbed this and produced considerable reaction, which in low water presented an obstacle to the upward passage of the fish. In addition to that, the low water permitted the working of seines on the very floor of the fishway, a circumstance which the lawless fishermen were not slow to take advantage of, and they defied the state authorities placed there to watch the fishway, and on one occasion destroyed the state boat and ill-treated its crew. The Lancaster authorities were applied to for a remedy and assistance against this lawlessness, but the state police were informed that they had their remedy already—that of any citizen for assault and battery.

As may be imagined, against numerous bands of men united together, far outnumbering the state police, this was an ineffective defense. Still, although plainly the commission and their police were without sympathy from the Lancaster authorities, they determined pluckily to do what they could, and the latter were instructed to do their best to fasten illegal acts upon individuals of these bands. These instructions were

faithfully carried out during the season, and at the end the commissioners had the satisfaction of having secured the imprisonment of some half dozen or more delinquents for their illegal acts.

Notwithstanding all this, however, large numbers of shad succeeded in passing up the river. At an island, some few miles above the Columbia dam, a catch of one thousand five hundred was made, and at other points between Columbia and Juniata the catch was quite respectable, reaching at the main batteries to some five thousand. Below the dam to Turkey Hill, a distance of little less than five miles, in 1879, 32,000 were taken and in 1880, 47,000.

In the latter year the commissioners addressed a letter to the Maryland commissioners, suggesting that shad fishing should be made free to all comers on the Mondays, Wednesdays and Fridays in each week of the season, making the balance of the week a "close time" in which fishing by all parties should be prohibited. The Maryland commissioners, however, stated their inability to do this thing, first, because the Maryland legislature would not meet until two years later, and in the second place they considered the "close time" proposed impracticable. They suggested, however, a shorter one, namely, from Friday night to Monday morning and the total cessation of fishing on the 10th of June.

After the first two or three years the hatching of shad seems to have been abandoned by the earlier members of the commission, for, according to the reports of 1879–80, it is found that the 450,000 shad fry placed in the Susquehanna had been received from the United States Fish Commissioners at Havre de Grace.

In 1881, Mr. Howard J. Reeder retired from the fish commission, and Arthur Maginnis, of Swift Water, was appointed, and Hon. B. L. Hewitt was placed at the head. Beyond a few attentions to the fishways already in the dams, nothing was done in this important matter. The hands of the commissioners were tied for lack of funds, and they could do little more than make repairs. Strong efforts were also made to bring illegal fishermen to justice, but as they had almost uniformly the sympathies of the grand juries, before whom their cases came, but little was accomplished. Through the United States Commission there were received and put into the Susquehanna and Juniata in 1881, 3,500,000 shad fry, but none in 1882.

In 1883, there was almost an entire change in the make-up of the commission, only Arthur Maginnis, of Swift Water, being retained. John Gay, of Greensburg, now manager of the Pennsylvania exhibit of the Columbian Exposition at Chicago, was made president, and with him were appointed as associates H. H. Derr, Wilkes Barre; A. M. Spangler, Philadelphia; Aug. Duncan, Chambersburg, and Charles Porter, Corry. To these gentlemen must be given the credit of introducing the only fishway which has proved eminently successful. For two years or more they carefully studied various models submitted, but all which

gave promise of efficiency were of such a costly character as to preclude any idea of their adoption.

At length their attention was drawn to the Rogers "ladder," a Nova Scotia invention, which combined simplicity, durability and efficiency with comparative inexpensiveness. A personal inspection of a number of these "ladders" or "fish-ways" in Nova Scotia waters, where up to that period forty-three of them had been in practical and successful use for a number of years, demonstrated to the commission, without doubt, that they possessed all the merit that was claimed for them. They had been introduced there by and with the consent and approval of the Dominion government and had been found effective. The gaspereaux and salmon of the Nova Scotia rivers ascended the "ladders" freely, and it was the decided opinion of the patentee that shad would ascend them as readily as the salmon or gaspereaux. So strong was Mr. Rogers' faith on that point that he agreed to erect one of his ladders in the dam that spans the Susquehanna at Columbia at his own expense, and waive all claims for pay until it was satisfactorily demonstrated that the "ladder" would successfully resist the destructive action of the ice freshets, and that shad in reasonable numbers would ascend it.

As the engineer of the first fishway erected in the Columbia dam was deeply impressed with the importance of having two ladders at that point, and as the commissioners had every reason to believe it would prove a success, a second one was ordered to be built at the state's expense without any guarantee from the patentee.

The building required about four weeks, and while the work was under way, and before it was completed, and during the period that the men were at work, two black bass and a sun fish tried the experiment of going up through, the first accomplishing two-thirds and the last one half the distance, just from what water collected in the buckets after they were put in from the leakage from the top end of the way. It was presumed, and no doubt truly, that many went through the ladder while the men were away from the work at night.

The Rogers' fishway successfully withstood the great ice freshets, and the shad every season passed through them with great freedom.

While accomplishing this great work, the commission were not idle in other directions in their efforts to restore the shad fishing industries to their prestine richness. Their fish wardens acting under orders waged a vigorous warfare on the fishermen who used illegal devices. In Huntingdon county the sheriff failed to give the warden support in his desire to have the fish baskets removed, saying that he was averse to putting the county to any expense on that score, whereupon the warden acted on his own responsibility and demolished eighteen fish baskets in the Juniata river. Besides these nearly two hundred of these illegal fish traps were destroyed in the main waters of the Susquehanna.

With the expiration of their term of office, the gentlemen who had

accomplished this work, encouraging the first great advance in the task of restoring the shad rivers, retired and an entirely new board was appointed. The appointees were Henry C. Ford, Philadelphia, president; H. C. Demuth, Lancaster, secretary ; James L. Long, Pittsburg, corresponding secretary; W. L. Powell, Harrisburg, treasurer; S. B. Stilwell, Scranton, and A. S. Dickson, Meadville, associates.

The new board found a much more encouraging condition of affairs than its predecessors had done in their assuming office. A satisfactory fish-way for dams had been found, and the work of getting rid of fish baskets seemed to have made some progress. Feeling sure that there was little use in undertaking the work of shad propagation and river stocking until the illegal devices were removed from the waters, they started vigorous work in that direction. Hearty co-operation in this was offered by the commissions of New Jersey and New York, and the good work in the Delaware was begun. Hon. L. M. Ward, the New Jersey Fish Commissioner, for the upper portions of that state, took an active personal share of the work, and the New York commission detailed their game protectors to operate in conjunction with Mr. Jesse M. Miller, the efficient warden of the Delaware from Hancock to Port Jervis.

Every fish wier that was come upon was destroyed promptly, but the work was not accomplished without difficulty and danger, collisions between the wardens and the enraged fishermen were common, and on one occasion Mr. Moses W. Van Gordon, the warden from Port Jervis to the Water Gap was fired upon in the prosecution of his duties. The would-be murderer was promptly arrested and punished, and the fish wiers he had owned destroyed. There had been numerous threats of killing the wardens about this time, but the summary and stern manner with which this case was disposed of had a wholesome effect, and the wardens thereafter had little trouble. Mr. John L. Bruce, the warden who patrolled the river between the Water Gap and Trenton was equally vigilant and cleared the waters of all illegal devices. So thorough was this patrol work done that by the close of 1888, it is said that for the first time in a century, the Delaware river was entirely free from fish baskets, wiers and traps.

Although an equally vigorous policy was adopted for the Susquehanna river, the results, it is to be regretted, were not so encouraging. From the nature of the river, with its great breadth and numerous islands, the work prevented many difficulties, besides which the numerous tributaries and their great length were drawbacks to complete success.

Although the commissioners succeeded in getting rid of the fish baskets in the Delaware, they found they had another and serious trouble to surmount in their efforts to restore the fishing industries. This trouble was in the laxity of the prevailing laws, the confusion of conflicting enactments and hinderances in the way of prompt prosecution. Indeed, the code of fishing laws in some instances seemed better

designed for the escape of the offender than for the benefit of the prosecutor.

To remedy this anomalous state of affairs the Commissioners of Pennsylvania, New Jersey and Delaware held several meetings in Philadelphia and formulated a code of laws that would be uniform for the entire river. At a conference with the New York commission, a similar bill was submitted and endorsed by them. All these inter-state bills were subsequently passed by the legislatures of the respective states and another big point was gained in the work of the restoration of the fisheries.

The design of these bills were principally to define a close season throughout the river for shad; to designate a close season for sturgeon before unprotected below Trenton Falls; to guard for a limited time new species of food fish introduced into the Upper Delaware, and to protect the shad spawning ground of the river above tide-water.

There remained now nothing to prevent the river from being once more prolific from one end to the other but a fishway in the Lackawaxon dam, and restocking with artificially hatched fry. The first was accomplished in 1890 and the other was begun at Gloucester by the United States Fish Commission in 1887, who sent the steamer "Fish Hawk" there for that purpose at the solicitation of the Pennsylvania Fish Commission. In that year 35,000,000 shad fry were hatched and deposited in the Delaware, and its tributaries.

At the same time a similarly large amount of fry was planted in the waters of the Susquehanna hatched at the station at Havre de Grace.

While the Pennsylvania commission was busily engaged in clearing the Delaware of traps, baskets and other illegal devices, and striving for uniform laws between the states bordering on the Delaware, they yet found time to construct six additional fishways of the Rogers' pattern in the Columbia dam, to open the Juniata so that shad could ascend its waters, and perform other creditable work, the details of which will be developed later in this work.

In 1889 the fish commission of the state induced a resident of Gloucester, New Jersey, to set apart a piece of ground on the river side and build thereon a structure for a shad hatchery. This was done, and on the request of the commission the United States commission began operations there with Mr. John Gay in charge. Under his skilful management many million shad eggs were hatched and deposited by the Pennsylvania commission in the headwaters of the Delaware. For reasons, however, not given this hatchway was abandoned by the government commission after the second year. The success of the work was nevertheless so great that the Pennsylvania commissioners determined to establish a hatchery of their own, and one is to be fitted up for operation next year.

The work of restoration in the Delaware was almost marvellous in its

success. The fishways in the Lackawaxon dam, put in jointly by the Pennsylvania and the New York commissioners, gave one hundred miles more of the river to the shad, yielded that much more area for spawning purposes and enabled the people of the far upper valley to once more enjoy a food fish of which they had long been deprived.

To what extent the fish passed to the upper waters of the Delaware is shown by the following extract from the report of Fish Protector Snyder to the New York commission in 1891. He says: "Since the building of the Lackawaxon dam, forty-five or fifty years ago, not a shad was seen above the dam until the spring of 1890, after the fish-ways were put in, which have proven a great success.

"The Burrow's dam (in New York) is about seventy miles above Lackawaxon dam. I was informed by reliable witnesses that last spring there were vast numbers of shad below the apron of the dam and that for many rods the water was a solid mass of fish.

"On the east branch of the river, last spring, the shad ran up to within about thirty miles of the headwaters.

"At Downsville (in New York) thirty-eight were caught at one haul with a net made of coarse grain sacks."

The great success in restoring the fisheries was not, however, confined to the upper Delaware. It was quite as marked below Trenton, where the largest and most valuable fisheries are. All the way from Trenton to Cape Henlopen the fisheries, most of which are on the Jersey shore, though owned principally by Pennsylvanians, became, by 1889, profitable, and by 1890 from $81,000 in 1873 they had reached in the aggregate to the splendid figures of half a million dollars.

The increase, when the work of restoration was fairly begun, was so marked that many of the fisherman became alarmed and their old complaints was changed to expressions of fear, lest there would be such an over production of shad that they would not be profitable. But the facilities of modern transportation were so great that a market was readily found for the surplus in distant cities, and to-day in the fish markets of Cincinnati, Cleveland, Chicago and other western cities the signs, "Delaware River Shad," are witnesses to the returned fecundity of the river and the value of refrigerator cars.

CHAPTER VIII.

History of the Pike-Perch.

The shad was not the only great food fish that inhabited the waters of the Susquehanna about three-quarters of a century ago in prodigious quantities. Pike-perch in countless numbers and of large size were to be found everywhere from the Chesapeake to the headwaters of the main river, and in the large tributaries. Although not indigenous to the river the fish became widely known as the Susquehanna salmon, and as such is still often offered for sale in the markets, and spoken of by many fishermen. It was under the name of salmon also that the apprentices rejected it as food in their indentures, more than once or twice a week.

In addition to these names this fish was known by many of the older residents along the Susquehanna as the swager salmon. It is also called wall-eyed pike, glass-eye, blue-pike, yellow-pike, green-pike and grass-pike. It is also occasionally called the pickerel and white salmon. The Cree Indians call it the okow, and the French Canadians dorè or picarel. Among the fur-traders of British America it is called the horn-fish, and in the Allegheny and Ohio it is called the Jack salmon.

Just how the pike-perch became an inhabitant of the river is something of a mystery, especially as, until introduced recently by the commission into other streams of Pennsylvania, the Susquehanna alone contained them.

The most plausible story of their introduction is related by Hon. Simon Cameron. He says that shortly after the war of 1812 a Jesuit priest and an Englishman living on the banks of the Susquehanna, who had previously seen the pike-perch in Seneca Lake, New York, conceived the idea of transplanting them to the waters of the river on which they lived. They accordingly made the journey to this lake and captured several specimens and brought them safely to Chemung river, a tributary of the Susquehanna, where they were deposited, at Elmira, then known as Newton, and there set them free. While the distance between Seneca Lake and Chemung river is but twelve miles, the way in those days was beset by many difficulties, and considering this the bringing of these few fish successfully from their native waters to their new home is much more remarkable than the feat which has been accomplished in the present generation of carrying live fish several thousand miles.

From these transplanted pike-perch, it is said, the "salmon" of the Susquehanna have all sprung.

They multiplied so rapidly that in a very few years they swarmed in the deeper waters and became one of the staple food fishes of the Susquehanna. Their solid, heavy meat, richer even in flavor than the striped bass, sometimes called the rockfish, caused the people to consider them even superior to the shad, and notwithstanding their number they commanded a much higher price.

They were caught in seines, on hooks and lines, and were the sport to the gigger at night. Nescopeck Falls, directly opposite Berwick, near where the Nescopeck creek empties into the river, was a noted place for "salmon" fishing with hook and line. Men standing on the shore with long poles and lines would often, in drawing out the fish, lodge them in the branches of the trees, giving them the appearance of salmon-producing trees. The present generation fish for them by two methods, by steel fishing with minnows and by trolling. In angling by the first named manner, live minnows are used in preference to all other baits, particularly such as are more or less transparent and with silvery sides, as the fall-fish or dace, the corporal roach, the red fin and the gudgeon. When trolling, the favorite method between Columbia and Harrisburg, a small lamprey eel is usually attached to the spoon in place of the feathers, sunk very deep, near a rocked ledge and drawn through the water much more slowly than when after other species of fish. When a pike-perch first strikes, it is not a strong, vicious try that is felt, such as other members of his family give, but a steady pull such as might be made by a man hauling in a line with his feet braced. This peculiarity often leads the angler to imagine for a time that his hook is fast on a log. But when the fish is brought near the surface it abandons the sullen hang-back policy and begins a vigorous fight for its life, affording the angler more than fair sport. It is a peculiarity of many of the boatmen in this section, that when a fish is struck he will begin rowing as endeavoring to escape from an enemy, and unless stopped very quickly will succeed in drowning the pike-perch, before the angler has had a chance to extract any sport from his catch. This curious habit is due, it is said, from their own habit when fishing to get their prey out of the water as speedily as possible.

Besides the name of Susquehanna salmon, the pike-perch is also known as the "Jack salmon," though the fish is not related in any way to the salmon tribe, but belongs to the perch tribe family.

In the report of the Pennsylvania Fish Commissioners for 1892, is found the following excellent account of this valuable food fish:

"The pike-perch or wall-eyed pike inhabits the Great Lake region and extends northward into British America, where it has been recorded as far as fifty-eight degrees north by Dr. Richardson. It ranges south in the Mississippi valley to Arkansas, and in Atlantic streams to Georgia. This species is said to reach a weight of fifty pounds," though such are rarely found. The largest specimen from the Pennsylvania rivers was

found dead on the banks of the Susquehanna under the Shamokin dam some time ago. This fish weighed twenty-two pounds and had evidently in life been a trifle heavier "but the average weight of the market specimens is less than five pounds." But fishes of ten or twelve pounds are not uncommon.

"The pike-perch feed on the bottom upon other fishes, and has been charged even with destroying its own young. It prefers clear and rapid waters, and lurks under submerged logs and rocks, from which it can readily dart upon its prey. Spawning takes place in April and May, and in Pennsylvania continues until June. The period of hatching varies from about fourteen to thirty days, depending upon the temperature of the water. The eggs vary from about seventeen to twenty-five to the inch, and a single female has been estimated to contain from two hundred thousand to three hundred thousand eggs. In a state of nature only a small percentage of the eggs are hatched out; the greater portion are driven upon the lake shores by storms and devoured by fishes upon the spawning beds." "Dexter," in *Forest and Stream*, August 14, 1890, makes the following statement about its habits in the lakes: "These fish run up the rivers before or as soon as the ice is out, and after spawning lie off the river's mouth feeding on and off the sand flats, as the spring rains bring down plenty of worms and probably other matter which they feed on. As soon as the water gets warm they sag off and work along the shores in two to thirty feet of water, preferring cobbly bottom; from here they go into very deep water, coming on the reefs to feed, and when the wind blows very hard for a day or so after a big blow, you will find them right on top of a reef. I think the wind changes the water over the reefs, making a new current and cooler water, so they come up to feed. They are a bottom fish, and to fish for them successfully we must go to the bottom for them. They are nearly as particular as salmon-trout about the water they inhabit, and consequently rank very high as a food fish, being very white, solid and extremely free from bones."

The pike-perch is fairly entitled to be called a handsome fish, even though there is something of ferocity in the appearance of its jaw. It is long and slender like a pike, with markings somewhat similar; a general color of mingled olive and brassy yellow, and with the strong shapely fins of the perch.

This is the characteristic appearance of the mature fish; the young are equally striking, with rapidly changing color as they advance towards maturity. They have, in their earliest stages, oblique dark bands, very much like the king-fish of the sea. "The eye of the living fish is like a glowing emerald," so green and fiery is it in its younger days.

The same reckless disregard of the rights of posterity and of others in their generation was observed by the fishermen on the Susquehanna with regard to the pike-perch as to the shad. As a result, this noble

food fish, like the shad, became more and more scarce, till from being in those waters in great abundance they were rarely met with.

While the Fish Commissioners of the state recognized the value of the pike-perch as a good fish, and viewed with concern its rapid destruction, not only in the Susquehanna, but in Lake Erie, one of its native homes as well, they were so situated that they were unable to do much towards their increase until 1889. In that year the attention of the United States Commission was also directed to the matter, and that year the latter body hatched about 12,000,000 fry at Sandusky, Ohio. These were turned over to the Pennsylvania commissioners, who deposited the greater number of them in the Susquehanna river and its beautiful tributary, the Juniata. Then believing that the waters of the Delaware and the Schuylkill were also well suited for this species of fish, the remainder were planted in the upper waters of the first and in the other near the city of Reading. These fry in the Delaware and Schuylkill took kindly to their new quarters and grew with marvellous rapidity, so much so that in March of the present year one was caught at Dingman's Ferry which weighed nine pounds and three-quarters, while large numbers have been caught which tipped the scales at four and five pounds. For the most part these pike-perch remain in the upper waters, being seen most abundantly at Lackawaxen, Hancock and Deposit.

In the same year (1889) the Pennsylvania commissioners also began the hatching of pike-perch eggs, using their new hatchery at Erie, and they distributed nearly 9,000,000 young fish of this species. In 1890, from the same place the commissioners sent out 13,545,000 pike-perch fry, and one year later they hatched the enormous number of 40,600,000, within 3,000,000 of the total number of young shad that were hatched and placed in the Delaware and Susquehanna rivers between 1889 and 1891. Not content with this enormous number, the commissioners redoubled their efforts and last year hatched out and planted nearly as many pike-perch, as had been encumbated by them in the previous years combined, the figures being for 1892, 59,000,000, for 1889–91, 63,135,000. Most of these young fry were placed in the waters of Lake Erie, but a vast quantity were deposited in the Susquehanna, upper Delaware and their tributaries. Large numbers were also planted in all the larger lakes of Wayne county, and some in those of Pike county, notably Silver Lake, near Dingman's Ferry.

Wherever they have been placed they have succeeded. In the Delaware, as already noted, many large fish have been caught, and the stock is increasing naturally; some have been captured in the Schuylkill river below Reading, and the fish of this species have increased to a marked degree in the Susquehanna. So marked has been the success of this endeavor, that the commissioners have strong hopes, can the present beneficient laws be maintained and enforced, that the pike-perch will become next to the shad, one of the most important of the interior food-fishes financially.

CHAPTER IX.

The Marietta Hatchery.

With the formation of the Pennsylvania Fish Commission in 1873, there arose the necessity for a fish hatching house. To have such an edifice the new commissioners looked about them at once for a proper site. In the selection of such a place they were governed by two considerations, first, that of an abundance of suitable water, and second, that of accessibility to railroads connecting the different sections. After visiting and making inquiries in regard to the numerous springs in various parts of the state, and after thoroughly canvassing the advantages of each place, they decided to locate the hatching house about two miles from Marietta, in Lancaster county, on Hoover's spring, one of the group of the famous Donegal springs. The piece of ground selected belonged to Mr. Michael Hoover; the spring from which the commissioners expected to get their supply of water, bubbled up almost beneath Mr. Hoover's house. The water seemed exceedingly well adapted to the purposes of fish culture, as it rarely varied more than two degrees in temperature throughout the entire year. Coming as it did, from limestone, the waters welled forth from the earth clear and sparkling, and of a splendid quality for healthy fish life. The spring, too, had an enormous capacity, yielding a flow of water equal to 3,000,000 gallons a day.

In the autumn of 1873, therefore, the commissioners purchased of Mr. Hoover one acre of ground in the immediate vicinity of the spring and on the banks of Donegal creek, then a well-known trout stream, a tributary of Chiques. With the ground they also purchased the right to use from the spring so much water as they might desire for the use of the hatching house. The price paid for the property, and perpetual right to use the water of the Hoover spring for the hatching house, was $2,000. Beyond a few willow trees this tract of land was bare.

The spot selected for the hatching house was some 750 feet from the spring, and the contract for its building was let to B. F. Heistand, the lowest bidder, his price including plumbing and fixtures being about $3,700. When the time came for its erection it was found that the ground on which it was to stand, was some two feet above the level of the spring, and to remedy this, while construction was going on, the commissioners enclosed the spring with a tight, compact wall, so as to increase the height of the water in the fountain.

The new building was one hundred feet long, and thirty-two feet wide, and in it were seventeen hatching troughs, each eighteen feet long and fourteen inches wide. Owing to the highness of the ground, it was

necessary to place the troughs almost on the ground so that the work of attending to them was anything but pleasant. The water which supplied them was brought from the spring to the house by means of a six-inch iron pipe. Thence it flowed through a trough running the entire length of the building; was cleansed by a number of flannel screens, placed at intervals through the boxes, and fed into the hatching troughs by iron spiggots an inch in diameter.

While looking about for a site for the hatchery, the commissioners were also on the look-out for a suitable man to superintend the operation of hatching the ova of such fish eggs as might come into their hands. On the recommendation of Mr. Howard I. Reeder, Mr. John P. Creveling was appointed to that position, and he has since remained, and by his skill in his chosen calling, his strict attention to his duties, and his devotion to the interests of fish culture, he has won for himself the respect not only of the Fish Commissioners of the state, but of all those who have been brought into contact with him.

John P. Creveling was born near Bethlehem, New Jersey, and his father's farm was separated from that of the genial and widely known angler and fish culturist, "Thad Norris," only by the Muscanetcongal creek. The buildings of Mr. Norris and of Mr. Creveling were so close together, that their owners could readily converse with one another without stepping out doors. Mr. Norris took a great fancy to the boy Creveling, and initiated him into many of the mysteries of his gentle art, and when he entered the work of fish culture at Troutdale, New Jersey, took the lad into his employ. Here Mr. Creveling laid the ground work of his knowledge of fish culture. One year after Mr. Norris sold out his fish hatching establishment to Dr. J. H. Slack, one of the Fish Commissioners of New Jersey, and this sale Mr. Norris said at the time, was made on condition that Mr. Creveling remained with the new purchaser. This he did for four years. At the end of that period he entered the employment of the Pennsylvania commission.

As soon as the hatching house on Donegal creek, near Marietta, was completed the work of hatching eggs was begun. The first species put in the troughs were one hundred and fifty thousand eggs of the California salmon. These had been received from the United States commission, but owing to several warm days, to the heat of which they were exposed during their journey, they arrived in such a poor condition, that it was only possible to save and hatch from them one thousand fish. These were set at liberty in one of the tributaries of the Susquehanna.

About the same time the commissioners purchased from Mr. Seth Green, the superintendent of the hatching house of the State of New York, one hundred thousand eggs of the salmon trout. These eggs were conveyed, with little or no loss, from near Rochester under the personal supervision of Mr. Creveling, and a large percentage were successfully incubated and the fry placed in the waters of the western part of the state in the following spring.

The commissioners at that time did not think it advisable to go heavily into brook trout culture. They argued that as there were far more fruitful fish it was better to devote their best energies towards increasing the river supply with such fish as the black bass, and shad, leaving the work of trout culture as an extensive operation together with the restocking of trout streams to future commissioners.

In order, however, that future commissioners might have a basis on which to work, trout ponds were built on the grounds of the hatchery, and Mr. Duffy, one of the commissioners who had some ponds of his own at Marietta, gave the state commission the privilege of stripping his trout of their eggs.

This was done, and something less than one hundred thousand trout fry were thus obtained. This, when compared with the production of trout from the two trout hatcheries in the state in 1891, 2,508,000, seems ridiculously small. But few as the numbers seem at this time, after the commissioners had used as many as they needed to stock their own ponds, they had great difficulty in disposing of the remainder. The work of the commission was not yet known, and, therefore, no applications were sent in, not even of the unintentionally humorous kind such as are now often received, like the following, for instance, received some time since by Mr. Ford, from a colored man in the heart of Philadelphia. "Dear Sir: Pleas send me some of them trout fry I hear of as I am fond of fried trout." Most of the young fish hatched were deposited the first year in various waters by the commissioners themselves. Nor was this an easy task for the cans in which they were then carried held fifteen gallons of water—double what those now in use do—and to the tired men who had to carry them they seemed as one of them said recently, to "weigh a ton."

The work was hard, much harder than at the present time, especially since, sometime after the erection of the hatchery, it was found that the enclosure built around the spring which supplied the water failed to work properly. During the seasons that were wet, the water would rise to the desired height, but as soon a dry spell came on the water would sink to the level it held before the enclosure was built. For some time this was inexplicable, but at length it was discovered that there were cracks in the limestone rock above the normal level, through which the spring water found an outlet as fast as it flowed, except in long-continued wet weather.

In consequence of this lack of water, the trout eggs were placed in floating boxes in the ponds and kept there until they had been brought to a certain stage of incubation and then were shipped to Corry, where a second hatchery had been established, and there fully hatched. The fry were then shipped back to Marietta for distribution.

With Mr. Creveling at Marietta as assistant was William Buller, now superintendent at Corry, and for two or three years their lives during

the winter were sometimes times of hardship. On one occasion, in the middle of a winter's night, when the thermometer had sunk far below zero, they both had to hurry from their beds to rescue the trout eggs from the floating boxes, the water in which they were freezing solid.

Mr. Duffy, who lived at Marietta, took a deep interest in the hatchery. He was a genial, whole-souled man, who hated and despised but two classes of men, dishonest men and fishermen who plied their trade illegally. As long as the hatchery was at Marietta the fish in his own ponds were freely loaned the state for spawning purposes, and from them come most of the splendid stock which are now in the ponds of the other hatcheries of the commonwealth.

CHAPTER X.

The Western Hatchery.

The work at the Marietta hatchery grew to such proportions with such rapidity that the need of another station was speedily made apparent. The commissioners, in 1875, therefore, began again the work of "house hunting." Among the places which attracted their attention was one at Corry, on the line of the Philadelphia and Erie branch of the Pennsylvania railroad, forty miles from the city of Erie, on the lake of that name.

The place was owned by Mr. Seth Weeks, and on it he had been conducting a small hatchery for brook trout. It was particularly well situated; its area was a little more than nine acres embraced in a compact oblong form. Smith street, a thoroughfare extending to it from Corry, divided the property in two parts, one of which, the lower, is heavily wooded, chiefly with the white pine, one of the most graceful of the American evergreens.

About two miles from the center of Corry, nearly the whole area of the lot is gemmed with springs of delicious water, but as the property has a gently inclined surface, except on one portion, there was no extra dampness or moisture. The streams which run from the springs flow over heavy blue clay; there the water, though clear as crystal, appears dark by reflection, a color rarely seen in spring water. So intense, indeed, is this reflection, that, except on very sunny days, the bottoms of the trout ponds cannot be seen.

But mucky though the waters appear, they are for the entire year of a singularly even temperature, varying scarcely a degree in winter or summer, and fishes of all kinds seem to grow rapidly and thrive, for at the present time there are brook trout in the ponds there which, for size, are more like shad than anything else.

Besides the springs and woods a pond or two graced the grounds, and there were also a very comfortable dwelling house and a large barn. This barn was an ancient edifice, and had been at one time a primitive saw mill, one of the very first in that section of the country. The timbers in it are of enormous strength and look as though they would last for a thousand years.

For the purchase of this property the legislature appropriated $2,000, and for its immediate improvement $3,000. With a portion of this latter money a first-class hatching house was erected. It was sixty feet long by thirty feet wide, and contained troughs of the most approved patterns, and much better adopted to the purpose for which

they were intended on account of the magnificent supply of water of the most uniform flow. Owing to the conformation of the ground also, the troughs could be built high enough from the ground that the men employed in the building could work without undue weariness.

The new acquisition was named the Western Hatchery on account of its being on the Pacific ocean side of the Allegheny mountains, and Mr. Weeks, the former owner, was made superintendent.

During the first year there were hatched and distributed from this new hatchery one hundred and fifty-four thousand brook trout, and eighteen thousand five hundred salmon trout. Besides these there was planted in the ponds on the grounds three thousand adult brook trout and two hundred and fifty salmon trout.

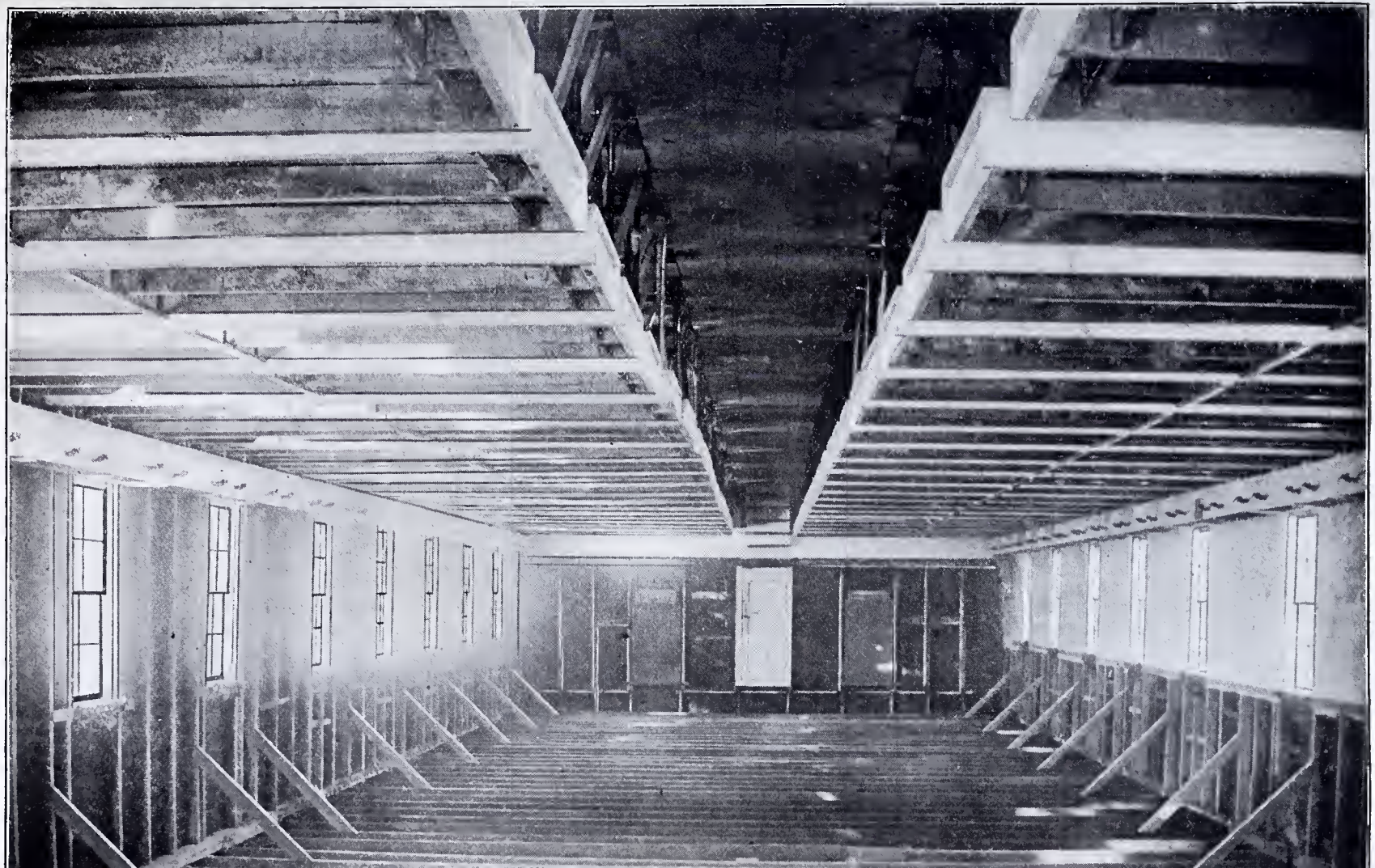
Soon after Colonel Gay became one of the Fish Commissioners, Mr. Weeks resigned his position of superintendent. But there was no difficulty in filling his place. For some time Colonel Gay had been observing the work of Mr. William Buller, Mr. Creveling's assistant, and it was characterized by so much intelligence and faithfulness that he was at once offered the vacant position. Mr. Buller, however, was an exceedingly modest man and had but little faith in his own ability. He would, therefore, have refused but was finally prevailed upon to accept.

Mr. Buller is a native of Maytown, Lancaster county. When the hatchery near Marietta was erected, Mr. Buller assisted in its construction, and on its completion entered the employ of Mr. Creveling, the superintendent. Here he gave such satisfaction that when the Marietta hatchery was abandoned, and the Eastern, or Allentown hatchery, was established, Mr. Creveling took him with him, and kept him until Mr. Weeks' resignation as superintendent of the Corry hatchery created a vacancy which he was admirably fitted to fill, and which gave to the state two officials of which the commissioners of fisheries of other states exhibit good natured envy, as being among the very best in the country.

Although a delightful situation with a good house and barn thereon, magnificent springs and handsome trees, when the commissioners first purchased the tract it bore the appearance almost of a primeval forest. Fallen trunks of trees were all over the place, sound and rotten stumps abounded, not only on the grounds but in the ponds, where submerged logs were also. The growing trees overcrowded the place, and tangled vines clambered about at will. To the right of the entrance the tangle was so great and the mud and marsh so plentiful that one could scarcely penetrate it.

The appropriation for improvement had not gone very far beyond the erection of a hatching house, and like necessary matters, so that when Mr. Buller arrived at Corry to take charge it seemed like an endless task to make an orderly place of it.

Colonel Gay accompanied Mr. Buller to the hatchery and the two undismayed by the Augean stable-like appearance of the place, went



each manfully to work. They labored early and late. The fallen timber and underbrush and tangled vines were cleared away, the overplus of trees cut down to give the rest room to spread, the marsh was drained, logs and stumps taken from the ponds, and the place generally put in ship-shape condition, and a new office and sleeping room was built. Eight additional ponds were then constructed, a handsome carriage drive built, a number of winding gravelled walks laid out, a good portion of the property sodded, some fountains erected, two or three rustic bridges thrown across the streams and ravine, and the whole place given a park like appearance, all at a trifling cost, for being deeply interested in his work, everything was done either by Mr. Buller himself or under his direct supervision, and the state, as a result, received all the benefit.

So attractive was the place made that it speedily became a resort for the people of Corry. Its handsome grove of white pines and rows of shapely maple trees set along the carriage drive made it even a place for strangers from even distant points to come to. The public were made welcome under certain rules and regulations. Picnic parties, for instance, were, of necessity, forbidden, as also was the feeding of fish or the disturbing of them in any way.

As the years went on and the work of the Pennsylvania Fish Commission became better known to the people of the commonwealth, there came constantly increasing demands for fry for restocking purposes. Of course, the heaviest was for the great commercial food fishes like the shad, pike-perch and white fish, but a vast number of trout fry were demanded by farmers and others, with which to stock streams which had become depleted by illegal fishing and water pollution. To meet this demand, the Fish Commissioners, in 1890, enlarged the western hatching house and purchased several additional acres of land adjoining that which they had, and on this new ponds were excavated. Even though this was done, and the capacity for hatching trout fry was doubled, the demands of the public are growing faster than the capacity of the plant, and more property will be needed at Corry before long to meet that demand.

The hatchway was lengthened to one hundred and ten feet and raised four. It contains eighty-eight hatching troughs, forty-four on each side the building. They are arranged in pairs, with narrow pathways between them, to enable the superintendent and his assistants to watch the process of incubation more closely.

These troughs differ from those in use in the other hatchery owned by the state, in that they are each twelve feet long, eighteen inches wide and seven inches deep. Besides their capacity, these troughs differ in being higher and much easier to work. Each one has a capacity for 20,000 freshly hatched fish, although at the end of two months this number must be lowered to 15,000.

Besides the addition made to the hatchway and to the grounds

through appropriation of the state, Mr. Buller last year erected at odd times in one corner of the place a meat house and a water wheel, so that the labor of cutting meat by hand to feed the fish has been done away with, and is now done better and more expeditiously by machinery.

The Corry hatchery now has thirty-one ponds for breeding purposes. One of these are for large lake trout, and there are here fish which weigh eighteen and twenty pounds, while the average of the fish will tip the scales at ten pounds.

Two other ponds are for large hybrid trout, some of which weigh as much as five pounds, while there are few under two.

Two ponds are for large brook trout, not one of which will weigh less than a pound.

Two more are for the brown trout of Europe, which was first introduced into the United States from Germany, in February, 1883, and of which much is expected. The fish in these ponds are but three years old and they run almost uniformly about three-quarters of a pound, although there are a few of more than two pounds.

One pond is set aside for California trout, of which much was expected some years ago, and the fish in them average two pounds each.

The other ponds, except three, are for two and three year old fish and yearlings, the three exceptions are generally used for yellow perch, or as they are better known about Philadelphia, "yellow neds."

While the work of this hatchery is supposed to be for trout of various kinds only, other fish are sometimes hatched. During last autumn, for instance, several million white fish eggs were cleaned up and later transferred to the hatchery at Erie, and this season Mr. Buller proposes to make the experiment of relieving the overcrowded hatchery at Erie, by hatching pike-perch eggs at the Corry station.

Mr. Buller has been very successful in taking and handling pike-perch eggs and during the past two years has taken and hatched many million eggs of that species at Erie, of which he is also superintendent.

CHAPTER XI.

The Eastern Hatchery.

For nine years the hatchery near Marietta was maintained by the Pennsylvania Fish Commission. But for some time previous the members had been dissatisfied, not with the quality of the water, but with the quantity. During long-continued rainy spells there would be an ample supply; but as soon as the weather became anyway dry, scarcely enough could be had to carry on the work of the hatchery. This was due to the position of the hatchery, and the impossibility of raising the water in the Hoover spring to a sufficient height.

An advertisement was finally published in the newspapers, asking for proposals for a suitable site. Seeing this advertisement Mr. William Lewis, of Allentown, wrote to Commissioner Hewit that he thought that Mr. Troxell's property and springs in the Little Lehigh river, about four miles from Allentown, would just suit for the purposes desired.

On receipt of this letter Mr. Hewit and Mr. Creveling paid a visit to the site proposed. They found it an ideal spot for their requirements, on the banks of a wide and boiling stream of water, so cold from multitudinous springs that emptied into it and bubbled up from its bed as to offer a refreshing drink in the hottest day in summer. The land swept away in a rise so gentle as to be almost imperceptible for several hundred yards to the base of a steep hill which rose for nearly two hundred feet and formed a complete break against fierce winds.

On this little patch of land they found an immense spring which bubbled up from the earth with such force that gravel and pebbles were thrown to some height, and discharged vast quantities of pure sparkling waters daily, far more than enough to supply the needs of the commission.

Mr. Reuben Troxell, at the time, conducted a small private hatching house of his own on the premises. The building was a little old dilapidated concern, that contained four troughs set upon the ground and one or two little ponds with adult trout therein.

Mr. Hewit and Mr. Creveling were so delighted with the place that, with the approval of the board of commissioners, negotiations for securing the property were entered into, and finally Mr. Troxell agreed to the following terms: That the state should have the property, including what trout were in the pond, at an annual rental of $225 for five years, and $300 thereafter, with the option of purchase at the end of five years for $12,000, and at the end of ten years for $15,000.

This lease was signed January 1, 1883, and the Marietta hatchery

property was sold to Hon. Simon Cameron for the price originally paid for it. Immediate preparations were made to transfer the stock to the newly acquired possessions. This was a hurculanean task, for a large quantity of fish had been accumulated in the ponds, besides the fixtures on the place. But it was safely accomplished. Not a single fish was lost in the journey. For this happy result the commissioners and Mr. Creveling, who superintended the work, were largely indebted to the Reading railroad. Mr. Wilson, the superintendent of the Reading and Columbia branch of that company, was untiring and ceaseless in his efforts to offer facilities and rapid transportation. He could not have taken greater interest than if the fish were his own. He had all the fish transferred from one train to another at Reading, and frequently when he knew a batch was coming over the Pennsylvania railroad, he would hold his trains for fifteen or twenty minutes in order that the cans of fish should not be delayed in any way.

While not in as a deplorable condition as Corry, the grounds at Allentown, to which was given the name Eastern station, were yet in poor shape, and the buildings rapidly running down, and Mr. Creveling and Mr. Buller found no small task before them. They worked manfully, however, began excavating for the new hatchery and straightening of things up, and to such good effect did they work that by September 1 the hatchery was completed, the hatchery troughs in and the place looked ship-shape.

Work was then begun hatching, and since that time the number of fish that have been there incubated and distributed is almost incredible, and only once did disaster overtake the efforts of Mr. Creveling. This was in 1888.

In that year the brook-trout fry were stricken with disease by which over 400,000 fry were destroyed. This epidemic resulted from the overcrowded condition of the fish, in consequence of insufficient accommodations.

For various reasons after the hatchery at Allentown was established it was determined to devote the most of the time to the propagation of brook trout, though large numbers of California trout, Atlantic salmon, German carp and other fish have been hatched at this station.

The building erected for this purpose contained thirty-four troughs, sixteen feet in length and eighteen inches in width, affording capacity for about half a million fry, with sufficient space to hold the fish and care for them until they were about four months old.

After having been settled a year or two several trout ponds were added to those already had, bringing the total number up to twelve, with 36,000 breeding trout of the brook and rainbow species therein. Five carp ponds were also constructed, but little success, comparatively speaking, was had from this species of fish on account of the superlative coldness of the water.

The trout ponds were surrounded by graveled walks and neatly sodded borders, and on more than one occasion Commissioner Derr forwarded choice flowers to be planted for summer adornment. Handsome willow trees scattered judiciously about the grounds added charm to the already picturesque place, so that it speedily became a popular resort not only for the people of Allentown, but for the neighboring and thriving city of Bethlehem, on what was once known as the Lehigh Valley railroad, but which is now a part of the system of the Philadelphia and Reading railroad, by which the hatchery may be reached at Allentown.

The disaster which occurred to the trout fry in 1888, gave the fish commissioners a strong argument to present before the state legislature for an additional building at Allentown, and the request was granted. Its size is twenty by one hundred feet, making with the old building, a hatching house two hundred feet long.

Unlike the station at Corry, the hatching houses at Allentown have all their troughs on one side of the building, occupying the whole interior save what is necessary for pathways. These troughs are set lower than strict convenience for working would call for, but not so much so as to be over-embarrassing or wearisome to the superintendent and his assistants. They are neatly colored black, and with white graveled bottoms present a pretty appearance besides being effective as hatching apparatus.

In addition to the hatching house, Mr. Creveling has had erected a meat-cutting house, and utilized the waste water from the ponds and springs to turn a wheel which turns the chopping machinery.

It is unfortunate that the state does not own this property. In a picturesque situation, not far from a railroad which has arteries extending to nearly every part of the state not reached by the Pennsylvania railroad, it possesses all the qualifications for the work of the fish commission, as has been amply demonstrated during the years it has used it. Considering the location, the price asked for the place is reasonable, in fact, it may safely be stated that a property as well fitted for the incubation of trout could not be secured in the eastern section of the state for the same money.

As long as the state does not own the grounds it would be foolish to make extensive improvements and develop it to its fullest extent, and make it what it deserves to be, one of the very finest fish hatching stations in the union.

CHAPTER XII.

History of the State Fisheries on Lake Erie.

Although Pennsylvania has but about forty-five miles of frontage on Lake Erie, its interests in the fisheries of these waters are considerable, the city of Erie, a flourishing town on this great water way, doing the bulk of the trade. The following history of the state fisheries on Lake Erie is contributed by Col. John Fleeharty, of Erie:

Ever since the appearance of the white man on the shore of Lake Erie it has been noted for the quantity, variety and fine quality of its fish. Long before the advent of the whites the Indian was aware and appreciated this fact, and fish in connection with game was his whole food supply. In addition to the fish in the lake, all of the small streams emptying into it abounded with brook trout and other species of small fish. And it is within the memory of many persons living when brook trout abounded within the present limits of the city of Erie. The writer when a boy has taken them within half a mile of the Union depot in a small stream coming down from the ridge, some place about Liberty street, and emptying into Mill creek in the neighborhood of Sixteenth and State streets. Big Cascade creek also abounded with them, and the taking of them was a source of great pleasure to many a disciple of Walton still living. And it is a source of unlimited regret to those ardent sportsmen that those days have gone forever. Upper Mill creek, Walnut creek and Trout run were noted for their fine fishing. In fact, without particularizing, all of the streams in Erie county were prolific in fish, and all of them contained many brook trout.

When the pioneers located on Presque Isle, in 1795, they had to resort to fishing in their log canoes from the lake and bay for the purpose of adding to their food supply, and the soldiers in the forts east of Mill creek laid in a large supply each season for their own use. Log canoes for fishing purposes were as much a necessity to the early settlers along the lake as log cabins to shelter their families, and each went fishing as his wants required.

In 1796, some twenty or thirty Indian families belonging to the Seneca tribe, resided at the head of the bay now known as "the Head," or Massassauga Point. After the advent of the white man, they fished and sold their catch to the whites, and were the first fishermen on the lake in northwest Pennsylvania. The beach was then much larger than it is to-day, and a heavy forest covered the low lands nearest the shore. But they gradually disappeared. This was the last Indian village in Erie county.

After their departure the site was occupied by a half breed negro named McKinney, who lived by fishing. He subsequently removed to the upper Laird farm, where he met his death by a fish bone lodging in his throat while eating. One of his daughters married Ben Fleming, who was the last survivor of Perry's fleet residing in Pennsylvania. Following him came Moses Muzzy, and then Ben Fleming, both of whom made their living by fishing in the bay from log canoes.

At that time the bay of Presque Isle abounded in all varieties of lake fish, particularly the black bass, and all fish were taken with the hook and line prior to 1830. Then followed David Fowzier, who was the first seine fisherman. About this time, 1830 or 31, Thomas Horton, Wm. Buchingham and Abraham Huntsburger, went into drawing the seine. Ben Fleming adhered to the old method of hook and line fishing, at which he was remarkably successful, he always claiming that David Fowzier had taught him the secret when he (Fowzier) embarked in seine fishing. At all events he was, and is still known, as one of the most expert and successful fisherman that ever fished in this vicinity. What success he would have now on his old fishing ground, where fish, particularly black bass, once so abundant, now so scarce, can only be conjectured, but it is most likely that he like Othello, would find his occupation gone.

The ponds in the peninsula, and Pike pond on the south side of the bay near the harbor entrance, were the spawning grounds for a large variety of fish. Pike pond was rated for the number and size of the grass pike. They lay upon the bottom, in about two and a-half or three feet of water and were taken by shooting or spearing. Some of these were extraordinarily large fellows.

But the black bass and lake pike have always been the game fish of the lakes, and trolling in a school of black bass is the finest sport for a tour fisherman that can be conceived.

Hon. James Hoskinson, of Erie, contributes the following: "In early days the abundance of fish in the bay and lake was beyond comprehension. About 1826 or 1827, when a boy about fifteen, I went fishing with David Fowzier in his log canoe. We crossed to Big Bend on the peninsula, and had just got ready to begin fishing when it came on to blow heavy down the lake, we were forced to land and was storm-stayed on the peninsula for three days. We got out of provisions, and the last day I was the hungriest, most unhappy lad ever known. I wanted to get home, and I wanted something to eat, but I could not keep still and I wandered off into the woods to hide my feeling from Fowzier. I had gone I suppose two or three miles from the bend when I came across old Mr. Slocum, who was on the peninsula trapping. It was then the middle of the afternoon. He asked me where I came from and I told him, and who my parents were. He knew them well. He asked me if I had eaten my dinner, I told him no, I had eaten nothing

that day. He immediately produced from his bundle, a large piece of corn bread and a big piece of raw salt pork. I had never eaten raw meat before, but I think it was the sweetest morsel I ever tasted.

"Thomas Horton was the first man to send fish to the surrounding towns and villages. I have seen plenty of four and five pound black bass sold for three cents each. Moses Muzzy had formerly been an officer in the American army in the Revolutionary War. In addition to fishing he at certain seasons of the year lived on the peninsula, trapping for muskrats, foxes and other game. This was as early as 1816 or 1818. He was an eastern man coming from the vicinity of Boston. Owing to some family trouble, he had not informed them of his locality since the war. One of the sons embarked in business in Boston, becoming wealthy, and in some manner learned where his father was, and his mode of life, came on here and persuaded him to return home with him. He had always preserved his uniform, and every 4th of July put it on and visited Mr. Hoskinson's father, who had been an officer in the army with him.

"About 1824 25–26 small vessels used to go from Erie to Machinac every fall to fish for white fish and trout; cured them there, packed them in barrels, and when full loaded brought them to Erie. On one occasion they came back so late that they had difficulty getting into the harbor owing to ice. A good market for them was always found; many of them were shipped to Pittsburg. There were eight or ten vessels engaged in this trade every fall for several years. Hon. Seth Reed, P. S. V. Hamot and Capt. John Dixon, had vessels so engaged.

"Capt. John Dixon built the first dock and warehouse in Erie and from there all of the limited fish business was transacted. Grass pike were plenty in pike ponds, lying in about two and one half feet of water. We speared and shot them. Fine turtles abounded there also.

"I remember on another occasion going fishing with David Fowzier, when about twelve or fifteen years of age. We paddled in a canoe from the old navy yard about the foot of Sasafras street, up along south shore of the bay to the "Head," which was then all forest. We had no luck and caught only two bass. Then we paddled across to Big Bend, and thence down the north shore of the bay to the White banks nearly opposite to where the pumping station of water works are now located. We got there about 5 o'clock in the evening, and found eight or ten canoes fishing, all having excellent luck. Fished for about two hours and loaded the canoe with fine bass. So many that when we started back (about dark) we could not carry them home. We took what we could, and left the remainder in the canoe and went back for them in the morning. In those times many of the farmers in the vicinity of Erie owned canoes which they brought in on wagons when they wanted to fish. I have seen forty or fifty canoes fishing on the bay at the same time." Mr. Albert Bosburgh, who has been more or less conversant with fishing and fishing interests since

1830, says he remembers Ben Fleming, Horton, Fowzier, Huntsburger and William Buchingham, all of whom fished with seines except Ben Fleming. He fished mostly in Big Bend from a log canoe about eighteen or twenty feet long which he propelled with a paddle. His fishing was generally done by trolling. He used crabs for bait and kept them in an old coffee pot, into which he always put a small quantity of asafœtida. He was wonderfully expert as an angler and invariably had good luck. He started very early in the morning and usually returned between two and three o'clock in the afternoon with his canoe full of fish, mostly black bass, weighing from four to five pounds. He would clean them and put five of them on a string and sell them for twenty-five cents, going from house to house. The other fishermen drew their seines in the bay or Misery bay.

In those days he says, "little or no fishing was done in the lakes, as the bay abounded in fish and there was no necessity of going outside. The catch was bass, perch, cat fish, pike and sturgeon, and always large. They were sold from house to house excepting a portion which was peddled in the surrounding country. Brook trout were plenty in all of the small streams, as well as rock bass and sun fish. There were also plenty of grass pike in pike ponds besides large fine turtles. Misery bay and the mouth of Mill creek has always been a fine place for rock bass fishing, as well as sun fish and perch."

From 1830 to 1850 the fishing along the Pennsylvania frontier was followed in about the same manner. There were no railroads into Erie and the market for fish was limited, as it always had been up to this time, and fish increased astonishingly. Erie was undoubtedly one of the finest fishing points on the lake, as it is to-day, notwithstanding the constant depletion which was going on for years after this.

Regarding the first white fish taken in Lake Erie, the writer believes he can speak definitely. In 1852 Captain Nash, a fisherman from Mackinac, took from there to Dunkirk, N. Y., two Mackinac fish boats, with gill nets and complete outfit and began fishing at that point as an experiment. He set his nets about eight miles northwest from the harbor, and his first catch was a large one of white fish. The writer was there engaged in railroad construction and distinctly remembers the excitement it created. It was mentioned in the Dunkirk, Buffalo and Cleveland papers of the day as the first catch of white fish on Lake Erie, and Captain Nash positively informed the writer of this. The writer has often heard of catches at other places about this time, and there was a great deal of notoriety given to the fact by the daily journals on account of its opening up a large trade in a very desirable fish.

Previous to finding the white fish it had been the custom all along the lake for persons who could afford it to send to Mackinac or Detroit every fall for a barrel, half barrel or kit of sugar-cured white fish for winter use, which were remarkably fine.

As soon as it became known that white fish had been taken in Lake Erie people began fishing for them in these waters. Barcelona followed Dunkirk, and then came Erie.

There are no brighter men than the fishermen along the lakes, nor any who can sooner see the advantages of such a discovery as this. Although these men may not be educated, they are of unusual intelligence, and know the ways of the fish as well as the fish themselves. Note the way they follow the fish from day to day and from point to point. The fish, driven from their favorite grounds by the gill nets, seek other points. The prey is no sooner there than the fisherman has the same nets ready for it. It is not instinct, it is knowledge. They know every foot of the bottom of the lake in the locality they are fishing, and can find their nets in the dark, or in a fog if necessary. They go outside in all kinds of weather, and when the large steamers are storm stayed the fisherman is on his ground pulling his nets. He is fearless, and yet cautious; a man to excite the greatest admiration.

"Captain" Michael Bowman says he commenced seine fishing in 1853. The catch was usually black and white bass, sauger, pike-perch, cat fish, suckers, etc. The fish were very plenty, the catch averaging fifty pounds per day per man. Mr. George Schaffer says the first white fishing at this point was in 1853. At this time, Captain Bowman says that only ten or twelve nets were used in a string, and the fact that white fish could not be taken here created considerable excitement and gave a great impetus to the fishing industry.

The first shippers were George Witter and John Sutter & Co. All fishermen, Jake Heidt and Michael Liebel, were of the firm of Sutter & Co. August Schutte was also actively engaged in fishing and shipping. The average weight of the white fish at that time was from six to twelve pounds. About this period the fishermen used six and six and one-half inch mesh nets, of No. 22 and 25 thread. About 1856–57 more trout were caught than white fish. We fished in fourteen to sixteen fathoms from twelve to fifteen miles in the lake. There was only three or four sail boats in all. The cost of an outfit about that time about, $600. Pound nest fishing was began at Erie in 1868. At that time there was no sale for herring, and they were put immediately back in the lake if caught, and they were abundant in shoal water.

In 1867 there were only nine fish boats fishing out of Erie, and all were sail boats. The first steam fish boat came to Erie from Ashtabula, Ohio, in 1874 or '75. Captain Clark Jones says, "commenced gill net fishing in 1854 or '55. Began shipping white fish east and west about 1856. Shipped in barrels and kegs of about 1,000 to 1,500 pounds and 200 to 300 pounds. Also sold to peddlers. On a gang of ten nets three men. Used jerk floats and jerk stones; sturgeon twine for nets. Then we introduced snap floats, same stones as before. Then Daniel Weeks introduced iron rings, from five to six inches across, in place of stones. Used

a five-inch mesh hand-made net. C. Charles & Co., of Huron, Ohio, who were fishing here, decreased size of mesh to four and one-half inches and cotton-wood bark for floats. This was about 1860. About this time the catch of white fish and trout was small here for some reason, and Clark & Co. brought a gill net to fish at thirty feet from bottom of lake but it was a failure, as the fish would not rise; but soon the catch improved again. They set trap nets in bay and caught cat fish and sturgeon.

"At that time sturgeon were considered of no use and were taken to the peninsula and buried. Thousands of them have been buried there. To-day they are worth two dollars and fifty cents each. Smoked sturgeon is considered fully equal to smoked halibut, and the roe is very fine, making an excellent 'caviare.' Each fish yields from twelve to fourteen pounds. Most of the meat is sent to Sandusky, Ohio, for curing and smoking. It is worth from five to eight cents per pound for smoking. This is mentioned here to show what an inordinately large number of valuable fish were thrown away as useless that are now very scarce and valuable."

Captain Jones continues, and says that in these days (about 1860) the largest catch of white fish he remembers were 3,500 pounds when dressed, averaging five pounds each. This was taken in one boat, three men and thirty-nine nets. This catch was sold to Buffalo parties for seven dollars per hundred. The largest white fish he ever caught was fifteen and one-fourth pounds. They have frequently been caught at Put-In bay weighing twenty-five pounds.

William Terry says he began fishing in Green bay, Lake Michigan. He came down to Erie about 1857 or '58. At the time he came here he found them fishing for white fish and trout. The catch was about equal. At one time soon after he came, R. P. Burke and himself, each with a boat took forty-eight trout apiece weighing forty or fifty pounds each, besides all of the white fish the boats could carry. It was an enormous catch and was taken about twelve miles outside of the harbor with five and one-half inch mesh, one pound of thread in each net, twelve nets to a gang. They sold to a peddler named Burton one hundred dollars worth of white fish and had more than half of them left. They shipped eighty-eight trout to a dealer in Sandusky. This was in 1859 or '60, and was the largest catch he ever saw in those days. In those years fish were very plentiful. At the head of the bay sturgeon were very abundant, but no sale for them. When caught were buried or given to farmers for manuring land. Among the fishermen were Loramer and R. P. Burke, who came from Green bay, Dan. Weeks, John Dash, Sr., Robert Tuttle, William Oakum and Frederick Dunn, besides others mentioned previously. "I have seen," he says, "white fish sold for one cent a pound. The overplus was cured, packed and sold to grocers by the hundred pounds. These were called slime fish. We also sugar-cured white fish for families, this was done in the fall of the year. They

were put up in half barrels and sold for five dollars per hundred pounds. They were not salted much and were nearly the same as fresh fish. They were very fine and always in demand."

Mr. Terry is the first man who ever skinned a blue pike in Erie. It was a hard thing to do, and was considered his secret and was always done "sub-rosa;" but a boy named Jocob Staub got on the top of a shed once when he was skinning them, peeped through a crevice, discovered the secret, and afterwards practiced it, much to Mr. Terry's discomforture. Now they are skinned when frozen, but it is a very difficult thing to do when not frozen. The largest white fish Mr. Terry ever saw was one weighing thirty-three pounds, caught at Spider Island, near Death's Door, Lake Michigan, and was an immense fish.

In 1857 or 1858, when Mr. Terry came to Erie, they used No. 25 cotton thread for making gill nets. Now nothing but linen thread is used —Nos. 45 and 50. The year he came here, in July, the fishermen had not had very good success that season, and could not account for it, and some thought that the fish were getting scarce, and most of them had pulled up their nets to wait for fall fishing. He brought as a present to R. P. Burke sixteen No. 30 linen thread nets. He and Mr. Burke went out and set them. The next day they went out and took them up and brought in a big haul of white fish and trout. This astonished all of the old fishermen. They began setting the cotton nets again with no success. When the nets were taken up, Daniel Weeks, at that time one of the most prominent of the fishermen, was very much mystified and after examining the nets and finding that they were made of fine linen thread, concluded that that was the explanation of it and immediately discarded his cotton thread nets and made new ones of linen, and met with good success in his fishing. This was the first change from cotton to linen thread nets at this point.

Mr. Terry is one of the oldest fishermen here. He is a man of intelligence and has kept thoroughly posted on all matters relating to fishing in this locality from the time of his arrival to the present.

The Dash family is a family of fishermen, father, son and grandson, John Dash, Sr., Adam Dash, John Dash, Jr., and John A. Dash. Capt. John A. Dash gave to the writer many interesting items relating to fishing in this locality, the sum and substance of which is very similar to what Mr. Terry and Capt. Clark Jones have furnished. Capt. Joseph Wick says that the largest trout ever caught in Lake Erie was caught by William Johnson in a trout net at Dunkirk, N. Y., in 1859. It weighed seventy-five pounds. He says he has frequently seen them weighing sixty-five pounds. He has been fishing all along the lake since 1857 and the largest black bass he ever saw weighed five and one-half pounds. He thinks the herring were getting more scarce every year, but that there were a great many salted during summer seasons all along the lake. Capt. C. W. Pruyn says that he caught a gold fish inside of

the headwaters at Cleveland, year before last, weighing one pound and one and one-half ounces. This fish is probably some of the gold fish put into the lake by Dr. Ackley, of Cleveland. He has no doubt but that they will propogate and increase in the lake, as he considers them a hardy fish when once acclimated.

He relates the following story regarding sturgeon: About fifteen or sixteen years ago, the north channel pier at this point canted over, owing to currents washing out the sand foundation on the north side. He was engaged on one of the tugs employed by the construction in making repairs. The tugs lay at the piers all night. Just before daylight one morning, stepped on to the pier and saw something moving in the water. It was too dark to see what it was, but after waiting awhile it became light enough and he discovered that it was a compact mass of sturgeon (hundreds of them), with their heads just at the edge of the water sucking the moss from the pier timbers. He stepped aboard of the tug and got a slack bur (used in firing), with a hook on it, and himself and two others, landed about twenty of them on the pier in a few minutes by hooking them in the gills. He says he could have landed many more of them, but at the time they were very plentiful and there was no sale for them. This was before they began smoking them and using the roe for caviars.

In Lake Erie, according to the review of the fisheries of the great lakes recently published by the United States Fish Commission, the cat fish rank next to the white fish in number of pounds taken. This may be so in some localities, but it is not so at Erie. They were formerly very abundant there, but are growing less plentiful every year. Erie receives her supply from the pound nets, and from the fishermen working between here and Conneaut, Ohio. They average from eight to twelve pounds, but are sometimes taken at twenty-five or thirty pounds.

As has been shown the black bass, the gamiest fish in the lakes, are becoming more scarce every year. Erie used to be noted for its fine bass fishing, and parties came here from abroad for that purpose. They are now becoming so scarce that they are seeking other localities for fishing. Within ten years the writer has seen two men going through the streets with a string of bass suspended on a pole between their shoulders, dragging on the pavement, the result of a half days fishing. The reef at Four mile creek was a favorite place to fish for them, and it was customary during the fishing season for the steam pleasure yachts to make daily fishing parties to their grounds. The channel and piers were also fine spots for these most excellent fish.

Formerly perch abounded in the bay, particularly in Misery bay, but they were by no means as plentiful as formerly, and yet they are not nearly as scarce as black bass in proportion. Rock bass and sunfish were some years ago exceedingly abundant. The different varieties of pike indigenious to the lakes formerly were in great numbers, but are

not now nearly as numerous. The herring are also not nearly as plenteous as formerly, although they are caught in large quantities still.

It used to be the occupation during the winter months of many persons to fish for them through the ice and as many as five to eight hundred persons have been seen fishing for them through the ice in the bay, and in the lake near the piers. The catch in the nets during the summer is large. They are taken from the fish boats, put into pans and into large refrigerators and frozen. The amount of salt used is three barrels to two tons of fish. In freezing this amount of fish about 2,500 pounds of ice is used. In shipping them they are put in boxes made for the purpose, holding about 250 pounds, and when taken from the refrigerator come out in slabs, of about thirty fish weighing about twenty-five pounds each slab, just as they are taken from the pans when frozen. There is also a large amount of them put up and salted in half barrels, kitts and pails for shipment and sale in the home market. The amount of white fish put up in this way is comparatively small.

Within the last few years there have been put into the lake different species of the carp, which probably have propagated and increased for several French and German carp have been caught in pound nets in this vicinity. Mr. Charles Lamb says that the average catch of white fish in 1888 was about 5,000 pounds per tug. In 1890 one catch was 7,900 pounds. In 1892 the average catch was 3,000 pounds. All of this was with one gang of nets. The pound nets often caught double this amount with fifteen or twenty nets in a string.

The white fishing grounds are about eighteen or twenty miles east or west of the harbor and about twelve or fifteen miles in the lake. Nets are set due north and south, and on the bottom, in twenty-five or thirty fathoms of water. Oftentimes good catches of white fish are made in pound nets near the shore.

The largest white fish ever taken at Erie, as far as known, was twenty-one and one-half pounds, and was taken by H. M. Parker, according to the Hon. Louis Strueber, one of the Fish Commissioners of Pennsylvania.

The muscalonge used to be quite plentiful in this vicinity, and is known as a game fish, affording the sportsman plenty of active exercise in taking them. The largest one taken at this point was sixty-two pounds; the next largest forty-four pounds. The average weight of them would be from twenty-five to thirty pounds.

E. D. Carter embarked in the business of fishing and shipping fish in 1874, and to him is given the credit of opening up a permanent market abroad. It is true, there were shipments of fish previous to this, as has been already shown, but it was only at times when there was an overplus on the market, and it might, therefore, be termed spasmodic. Hon. Louis Strueber went into the business in 1877, and the two were for years the only shippers from Erie, and they have always done a

large business. Frank W. Bacon & Co. have also been large shippers for some years.

On the 24th day of September, 1892, the Erie Fish Association was formed, by consolidation of the following houses: E. D. Carter, Louis Strueber, Frank W. Bacon & Co. and E. Knoblock & Co., making a very strong concern. The first day after the consolidation the catch of fish was forty-eight tons.

The following is a statistical account of the fish business on the lake, in Pennsylvania, for the year 1892:

28 steam fish boats and fishing gear valued at	$112,000
14 sail fish boats and fishing gear valued at	7,000
40 pound nets, boats, gear, etc.,	20,000
Estimated capital employed,	111,000
Estimated total capital invested,	$250,000

Number of men employed:

28 steam fish boats, 5 men each,	140
14 sail fish boats, 3 men each,	42
40 pound nets,	150
Otherwise employed,	168
Estimated total men employed,	500

An accurate account of the fish taken for commercial purposes during 1892 has been kept, with the following result:

Blue pike, in pounds,	2,968,659
Herring, "	8,300,633
No. 1 white fish, "	524,428
Trout, "	131,337
Pickerel, "	130,107
Perch, "	494,671
Mullett, "	63,146
Catfish, "	6,633
Black bass, "	4,286
White bass, "	40,675
Sheepshead, "	6,669
Sanger pike, "	24,633
Sturgeon, "	90,702
Total pounds,	12,786,579

CHAPTER XIII.

Erie Hatchery—Restoring the Lake Fisheries.

From the previous chapter it will be seen to what an enormous extent the fisheries of Lake Erie were conducted on the Pennsylvania borders, and yet this was but a tithe of the work of this character that was carried on elsewhere. Here, too, is the same wretched story of wanton destruction of food fishes and utter disregard for the future that has been told of the fisheries of the Delaware, Schuylkill and other waterways of the state. Previous to 1848, and the introduction of the villainous pound nets, white fish were, as already noted, abundant, but these destructive traps, together with the effect of human avarice, disregarding the times and mode of capture, worked the inevitable, disastrous result. Little by little the white fish industry declined, until about 1885, from a profitable business the catching of white fish became unprofitable, and as an exclusive industry was almost abandoned. The blue pike fishing, which had occupied second place, and the herring fishing, which was still further down on the list, forged to the front and became the chief industries.

Besides this, by an almost utter disregard of the spawning season, piratical fishermen inside the harbor of Erie had quite depleted what was formerly an inviting field for black bass and other game fish. Even at the present time in defiance of the laws, and of the knowledge of the evil consequences thereof, there are men who ply their nefarious trade in the waters of the bay. During a good portion of the past winter, nets were set through the ice, and it was not an unusual thing, it is said, to see black bass exposed for sale in the market freshly caught. So frequently indeed was this done that the Erie *Herald*, on March 18 of the present year, published the following:

"The mayor and councils should do something at once to break up illegal fishing in the bay. Now that the land is disappearing the pirates have commenced to set nets and the hauls have been very good. If the pirates are not run down, hook and line fishing in the bay will be entirely destroyed.

"A policeman should be assigned to duty as a fish warden, and if the pirates are caught they should be dealt with to the full extent of the law.

"Fish were offered for sale on the street market this morning which were captured with nets in the bay. A 12-pound pike showed signs of life when exposed for sale, showing that it had been lifted out of the

ERIE HATCHERY.

water only a few hours previous. All lovers of hook-and-line fishing should exert themselves in order to prevent the illegal catching of fish."

Colonel Fleeharty says:

In 1882 or 83, it was not a difficult thing for two persons fishing from a boat at the mouth of the harbor, just outside the piers, to load a small boat in a day's fishing. And during the winter months it was not unusual to see five hundred persons fishing through the ice for these fish, in and about the harbor. At that time their average catch would be about twenty pounds each. During the past winter, taking a concensus of opinion, it is estimated that for sixty-five days, there has been fishing on the ice, one hundred and sixty men each day, and the catch would yield five to eight pounds a man; but nearly all perch."

In 1877 the board of trade and the select and common councils of Erie extended an invitation to the State Fisheries Commission to visit the section, in company with a special committee of the legislature, to make examination of the operations of the fish industries there.

At that time the states of Ohio, Wisconsin, Michigan, etc., bordering upon the lakes, were beginning to pay special attention to the culture of white fish for its commercial value, and were annually making liberal appropriations for artificial hatching. Up to that year Michigan and Wisconsin had hatched 18,000,000 fry, while Ohio was running four experimental stations, and the object of the officials at Erie was to induce the state authorities to establish a hatchery in their city, in order that Pennsylvania might contribute her share to the common benefit.

The visit was made, but at that time nothing was accomplished. On the 8th of October, 1884, four members of the fish commission again visited Erie for the purpose of consulting with the citizens in regard to the establishment of a white fish hatchery at that point. They were warmly welcomed, a meeting of the trade was called and the subject thoroughly discussed.

A temporary hatchery was first proposed, the citizens agreeing to pay one-half the expense, but after making careful estimates of the cost and taking into consideration the lateness of the season, the conclusion reached was, that it would be neither advisable or feasible to commence operations at that time. In addition to this, the funds in the hands of the commission were not sufficient to meet that part of the outlay the state would have been required to assume.

The wiser plan, it was agreed, would be to make application to the legislature for an appropriation of $5,000, to be applied to the erection of such a hatchery as the state should have. This would include the cost of a lot, frame building of adequate size, a complete outfit of hatching jars, cans for the transportation of the fry to the points where they were to be deposited in the lake, and for employes. The assurance was also given that the city of Erie would furnish the needed water supply without cost.

Application was at once made to the state legislature for the necessary appropriation, and in 1885, $5,000 was voted for the establishment of this hatchery, in order that Pennsylvania might fall in line with Ohio and Michigan, who, by that time, had hatched and deposited in Lake Erie hundreds of millions of white fish.

The first step in securing the appropriation was the selection of a site which should at once be commodious and cheap. Such a situation was obtained in a corner lot fronting eighty-two and one-half feet on both Sassafras and Second streets, in the city of Erie. For this lot $900 was paid the owner, Mr. John Welsh.

Proposals for bids for the erection of the hatchery building were invited by public advertisement. Several proposals were received, and the contract for the erection of the hatchery was awarded to Mr. E. McDonald for the sum of $1,521.70, the designs for the building having been furnished by Mr. D. K. Dean, a professional architect. The necessary plumbing was done by Messrs. R. T. & R. Williams.

The new hatchery is a story and a half frame building, fronting thirty feet on Sassafras street and fifty feet on Second street. It is a neat, artistic building, with nothing about its exterior to give any idea of the character of the work to be done inside. Indeed, its lines were such as to give one the impression of its being the residence of a man of more than moderate means. To still further bear out this appearance, a pretty fence was built around the property and the grounds were tastefully laid out.

Within the building everything was arranged specially with an eye to the practical purposes for which it was erected. The room devoted to the work of hatching is commodious and well-lighted, and the floor was formed of cement.

At first five tables were placed in this room, and upon each was arranged twenty McDonald improved automatic hatching jars, with a capacity for 150,000 white fish eggs each without crowding.

Adjoining the hatching room is a large and well-lighted office for the use of the superintendent. On the second floor is a sleeping apartment for the attaches of the place, and a tank room, which contains a tank with a capacity of 1,200 gallons. This tank supplies the water to the jars with an even pressure, although in case of necessity the jars could be supplied with water from the city mains direct. For the first two years the water commissioners of the city of Erie supplied the hatchery with all the water that was needed free.

The new hatchery, which is among the very finest in the country, not only in point of beauty, but in perfection of appointments, was got into operation in December 12, 1885. Between that date and January 9, 1886, there were received in various lots 16,000,000 white fish eggs. Between March 17 and 31, 1886, there were hatched and set into the lake outside of Erie 14,625,000 young white fish.

Of this hatchery William Buller, the head of the hatchery at Corry, was given the superintendency, which dual position he yet holds with credit to himself and the state. Two years later the same number were hatched and deposited in the waters of Lake Erie.

In the three succeeding years 35,570,000 fry were hatched and distributed.

This work, in connection with that of Michigan and Ohio, had a wonderful and inspiriting effect, and created a revolution in the fishing industries of Lake Erie. In 1886 the catch of white fish only amounted to 61,500 pounds, while in 1888 the catch leaped to the astonishing amount of 2,200,000 pounds. The money value of the total catch of the Erie fisheries in 1886 was but $175,200. In 1888 it was $304,680, a difference of $129,480. This condition of affairs has increased, and last year the valuation of the catch was placed at more than half a million dollars.

As evidence of what is thought of the work of the fish commission in connection with Lake Erie, the following letter to Mr. Ford, president of the present commission, from Mr. E. D. Carter, a prominent business man of Erie, is submitted:

"Dear Sir: I enclose you a statement of the fish industries at Erie, Pa., and amount of catch for the season of 1888, and I flatter myself that it shows our industry at Erie to be in a most prosperous condition, and I am satisfied that the large increase in the catch of fish is the result of re-stocking from our hatchery and from the great work done by the states of Ohio and Michigan.

"Our catch of white fish, you will see, is fully double of what it was in the seasons of 1883, 1884, 1885 and 1886. Those in the business, after the very poor fishing of those seasons, had concluded to give up fishing for white fish, but the increased catch of white fish of 1887 changed the opinion of those engaged in the business and they continued the work, and from the result of this work the price has been reduced fully one-third and has brought this food from a luxury to one of the cheapest foods that a poor man can procure for his table, and my opinion is that this is entirely from the work of artificial hatching.

Yours respectfully,

E. D. Carter."

But the hatching of white fish was not the only work carried on at the Erie station. Large numbers of pike-perch were also incubated. At first in this work some difficulty was encountered, but was soon overcome, and owing to the rapidity with which the eggs of this species of fish incubate, large numbers were hatched and deposited, not only in Lake Erie, but in other waters of the commonwealth. In 1889, 8,900,000 were planted in the Juniata, Spruce creek, Susquehanna river, Delaware river and Warden's creek. In 1890 the number was increased to 13,545,-

000. Of these 7,000,000 were placed in Lake Erie, and the remainder in the rivers and mountain lakes of the state. In 1891 the number of pike-perch hatched and distributed was 40,600,000; 6,000,000 of these went into Lake Erie, 10,000,000 into the main waters of the Susquehanna, 5,000,000 into the Delaware and the remainder in the important streams and lakes.

CHAPTER XIV.

Trout Streams of the State.

To the majority of anglers, trout streams probably excite the greatest interest. In the number of water ways containing this great game fish, Pennsylvania admittedly takes the lead, and through the efforts of the state commission, seconded by the intelligent work of numerous fish protective associations, others, for many years barren of trout, are being added annually. It is true that for a long time this species of fish in the waters of the commonwealth have been reputed to be on the average smaller than those caught in some other states, but this has been due rather to over fishing than to any defect in either the fish or trouble with the element in which they live. Through the efforts of the fish commission, and through a better enforcement of beneficient laws, this slight drawback, not only to thorough enjoyment of angling but full value as a food product, is being removed, and at the present time the average catches compare favorably as to size with those taken elsewhere. Even were this not the case, and the average size of the trout caught annually were not increasing, this slight defect would be more than counterbalanced by the remarkable brilliancy of their coloring. Those caught in Maine, New York and West Virginia are far inferior in this respect, while of the other states only the trout taken from the waters of Vermont can approach those of Pennsylvania in beauty of hue.

Not only are the streams more numerous and the trout in them more beautifully marked and tinted, but, taken as a whole, the surroundings of the former are unsurpassed, generally unequalled in picturesque surroundings. So famous are they in this respect, that multitudes of anglers are attracted from other states noted for the prolific nature of their trout streams to the marked financial benefit of the people of the commonwealth.

The attention given by the fish commission to stocking the streams of the state with brook trout is looked upon by many as a useless expense. They argue that this species of fish is valuable rather for sporting purposes than for general food uses, though admittedly one of the most delicious in flavor of the denizens of the fresh water. But a moments thought will show how erroneous this idea is. By keeping the streams plentifully stocked, anglers brought by the fame of the beauty of the country are induced to come again from the sport they obtain. There followers of the gentle art leave much money in the commonwealth, and take nothing away, except, perhaps a few fish. Indeed in many sections

of the state the trout fishing, through borders and incidentals, forms an important part of the revenue. Apart from this, the sporting goods industry in the cities and towns of the state by this means are largely increased.

Trout fishing in Pennsylvania, by reason of the picturesque surroundings, tends to instil in the hearts of those engaging, a greater love for nature and her works than in most sections of the union. Even the backwoodsman who loves the "gentle art" for the arts sake, becomes thereby enobled.

A good specimen of this class of men is Philip B. Clark, a justice of the peace of one of the townships of Pike county, and every angler who has beaten streams in that or other sections of the state, must acknowledge having met many of his type. His mind is stored with a wonderful amount of useful and out-of-the-way information. Some of it he gathered from state and government reports, but the greater part came from the woods in which he has lived all his life. From generous nature he has drawn his choicest knowledge, and he delights to impart his gleanings to others. He has a boundless love for all plant and animal life, except snakes and noxious insects, which he classes under the general term of "divils." More than once when the writer has been out with him on a stream, he has known the 'Squire to drop his rod, even when the trout were jumping in numbers, to expatiate a moment on the habits of some woodland flower or the beauties of the scenery.

The trout streams of Pennsylvania are divided into what are known as the northern and the southern tier. Those tributary to the north and west branches of the Susquehanna river, to the Clarion and the Allegheny, the Delaware, Lehigh and Schuylkill belong to the former, and the remainder to the latter. Of the trout waters in the northern tier, those situated in Pike county are perhaps the best known; no pen can aptly describe the beauty of this region, the greater part of it covered by virgin forests, and the whole a mass of picturesque mountains of the Blue Ridge range, the tallest of which is High Knob near Blooming Grove, a peak which thrusts its bald head nearly three thousand feet above sea level. On every mountain side in the county, through every valley flow countless streams filled to repletion with speckled trout, and it is believed that no amount of fishing could clean the waters of them. The largest stream flowing through this section is the Big Bushkill, a noble stream which empties into the Delaware river, and is of such a size that for several miles above it mouth is considered good rafting waters. It has numerous tributaries nearly all of which have their rise in deep Cypress Swamps, so that the waters are colored a dark brown, and seem much deeper than they really are. All their tributaries, as well as the Big Bushkill itself, are splendid fishing brooks and many are widely known, and are famous resorts for New Yorkers, numbers of whom stop at Porter's pond, and Cartright's, at Twelve Mile pond where

BIG BUSHKILL CREEK, ABOVE RESIE, IN MONROE COUNTY.

bass and pickerel fishing are also to be had. The largest and most familiar of these tributaries are the Little Bushkill, where there is also a summer resort village of that name, Saw Creek and Red Rock run. Besides the Big Bushkill and its feeders, there are Tom's creek, Decher's and Dingman's emptying into the Delaware; the last, a particularly picturesque stream with numerous falls, one of which makes a clean descent of one hundred and fifty feet. Then there is the Raymondskill, also known for its beautiful scenic effect, as well as for its fishing qualities, also the Sawkill, near Milford; the Shohola, Paupach, Marthope and Blooming Grove creek, and a tributary of the Lackawaxen and others in the same vicinity. But above them all probably, not so much in the beauty of its surroundings, though grand in themselves, but in the plentitude and size of the fish in its waters, is Bright's run, a stream in the western part of the county. It is singularly free from underbrush, and abounds in long reaches where the fly can be used without trouble and with splendid results.

All of the waterways mentioned take their sinuous paths through the most magnificent country that can be conceived of. They abound in picturesque falls, some more than a hundred feet high, and frequently the waters have cut their way in boiling rapids through deep gorges of great beauty. As a counter to these wild scenes deep pools and long wide still waters are common, and in their dark depths, fringed by alder clethra and rhododendron brush, lie trout of noble size.

Adjoining Pike county, is Monroe, and like it, is exclusively a mountainous region, but it has more cultivated land and less virgin forest. Here, too, are many splendid fishing waters. The largest, by far, is Brodhead's creek, which towards its outlet in the Delaware, cuts through Stroudsburg, on the Delaware, Lackawanna and Western railroad. Its largest tributary is probably Michael's creek, a stream which runs from the direction of the well-known Wind Gap. Near the outlet of Brodhead's, Marshall's creek empties in. This stream is not only a fine one for mountain trout, but is well-known for its beautiful water falls, its curious and interesting geological formations, as well as for the pleasant summering village six miles from the water gap, and which receives its name from the sparkling stream.

Besides these, among other notable trout streams in Monroe county, are Paradise creek, at Henryville, and further up, at Canadensis, Levis, Bushkill and Middle Branch.

Besides these, the Tobyhanna and Tunkhanna, and the waters of the upper Lehigh, are very fine trouting streams, with attractive surroundings. The Tobyhanna, indeed, is reputed to have the largest trout of any waterway in the state. Fish of that species are said to have been caught there that weighed from four to six pounds, while there are authentic instances of trout weighing three and three-quarters pounds being taken therefrom with the artificial fly. The Tobyhanna was the favorite fish-

ing stream of that genial and famous old angler, Thaddeus Norris. Year after year this disciple of Isaac Walton was to be found upon its waters, and famous were the catches that he made. He made his headquarters at Henryville with "Jim" Henry, a brave celebrity. He, too, was a genial, angling-loving soul; a man full of harmless eccentricities that were the amusement of his countless friends, while they, at the same time, made him the more lovable. Like the gentle "Thad," he has passed over to the great majority, but the hostelrie which he once ran, and where more fish stories were told in one season than are usually related in other sections in three times that period, still exists and under the care of "Jim," Jr., a worthy son of a worthy father.

Next to Pike and Monroe counties, in point of attractiveness, are the streams of Wayne. Indeed, in the opinion of many anglers, they fully equal those of the two first named sections. They are more busy as a rule, and are not broken into falls such as those of Pike and Monroe, but they are of a more dashy character, running and tumbling over huge boulders in foam flecked stretches to the rivers. They run through mountaneous regions, however, quite as picturesque as their rivals in the other counties, and their trout are quite as large and game desirable in qualities. Some of the leading streams of this county are the Dyberry, Little and Big Equinunk, and Hollisters.

Passing southward towards the Bethlehem hills, in Northampton county, the Monocacy and Bushkill creeks contain many and large sized trout.

Among the Bethlehem hills themselves and in Lehigh county are to be found good fishing waters. This is especially the case at Allentown, where three good sized streams, the Little Lehigh, Jordan and Cedar creek run through populous regions, and partly through large open meadows with scarcely a fringe of brush throughout their entire lengths. Yet in spite of these drawbacks, from their sources to their mouths, they swarm with trout, large, fat and full of game. This condition of affairs is due to the Pennsylvania Fish Commission, one of whose hatcheries is on the Little Lehigh four miles outside of Allentown, and all three streams are splendid samples of what persistent stocking can accomplish in spite of a close proximity to built up sections and repeated illegal fishing, such as unfortunately they are subjected to.

Tioga, Bradford, Potter, and in fact all the northern central counties are full of trout fishing streams. The Sinnemahoning and West Branch of Pine creek are famous places. In Lycoming, the Loyalsock, on the West branch of the Susquehanna, Muncy, the White Deer on the East branch, Young Woman's creek, which runs toward Lock Haven, and the head waters of Clarion river in Elk county, all afford fine fishing, although they are unfortunately some of them contaminated by tanneries.

Of one of these streams in Elk county, not far from the line of the Philadelphia and Erie branch of the Pennsylvania railroad, known as

the Toby, a tributary of the Clarion near Wilcox, a good story is told. A number of years ago some gentlemen, one of whom was the late Colonel Kane, built a small hut on its banks and named it Mineral Shanty. Here they invited and brought General Grant for some hunting and fishing. After a few days' good sport the nation's great general and president discovered he had been fishing out of season and had, therefore, illegally killed a number of fine trout. Indignately he threw away his rod and straightway hied himself to the nearest justice of the peace, where he lodged a complaint against himself for violating the game laws. The justice of the peace, it is said, was disposed to be lenient towards the distinguished offender, but to his amazement, it is reported, General Grant delivered a short lecture to him for his weakness and insisted on being fined to the full amount and on paying it.

In recent years Chester and Delaware counties have been affording good fishing, and this has been due altogether through the work of the fish commission of the state. Most of the streams of these two counties run through meadows and rolling hills carefully tilled and kept clear of underbrush. As a consequence, unless carefully protected, the trout in waters in such locations must soon disappear. As soon as the fish commission began work in earnest not only to propagate brook and other trout, but to secure further beneficent fish laws, and their enforcement, as well as of those already in existence, several fish protective associations were formed among the farmers and other residents to give them aid. As a result, fully one-half the water ways of both Chester and Delaware counties contain large numbers of brook, and brown trout and occasionally the California or rainbow trout.

Not less interesting to anglers are the streams of the southern tier, although not so widely known as those in the northern, except in a few instances.

In this division of the state there is no spot more beautiful perhaps than the Laurel Hill range, or so little known outside the people who live thereabouts. Between it and Chestnut ridge the last of the kind of the Alleghenies is Ligonier Valley. It extends eastward twelve miles to the mountain town of Donegal, situated on a lateral ridge which connects Laurel range and Chestnut ridge, and divides Ligonier and Indian Creek valleys. At the other end of the former valley is the town of Ligonier and its situation is remarkably picturesque, commanding a perfect panoramic view of natural beauty, while within its figurative gates and about it reigns such a peaceful quiet that one is almost convinced of the possible existence of a Utopia or a New Atlantis. To reach it one branches of from Latrobe, where the railroad runs through a highly cultivated region for several miles, then circles about the mountain's base and rushes through a natural gateway into the valley, named in honor of Lord Ligonier, far back when some of our grandfathers' fathers were toiling with axe in hand and watchful eye on their

stacked guns, as they cut a clearing for the erection of their rude logs cabins. This entrance view is enchanting, and well deserves the name given it of Pennsylvania Adirondacks, for rising on either hand are the noble peaks of those lesser brethren of the Eastern Chestnut range of mountains, their faces and bodies adorned with a heavy growth of deciduous trees in garbs of light and dark green, with here and there a large group of stately pines, that raise their gracefully clothed bodies with dignity above their leaf-shedding brethren.

Furrowing a tortuous way through the mountain gorge, shining like a silver cord, and rushing by in rift and cascade in opposite direction to the train is the beautiful Loyalhanna stream, named in Revolutionary days for a maiden distinguished for her bravery and loyalty.

The life of the stream is given from a congregation of springs which bubble its birth from the Laurel mountains whose towering forms, veiled with sheeny purple, rise in the distance.

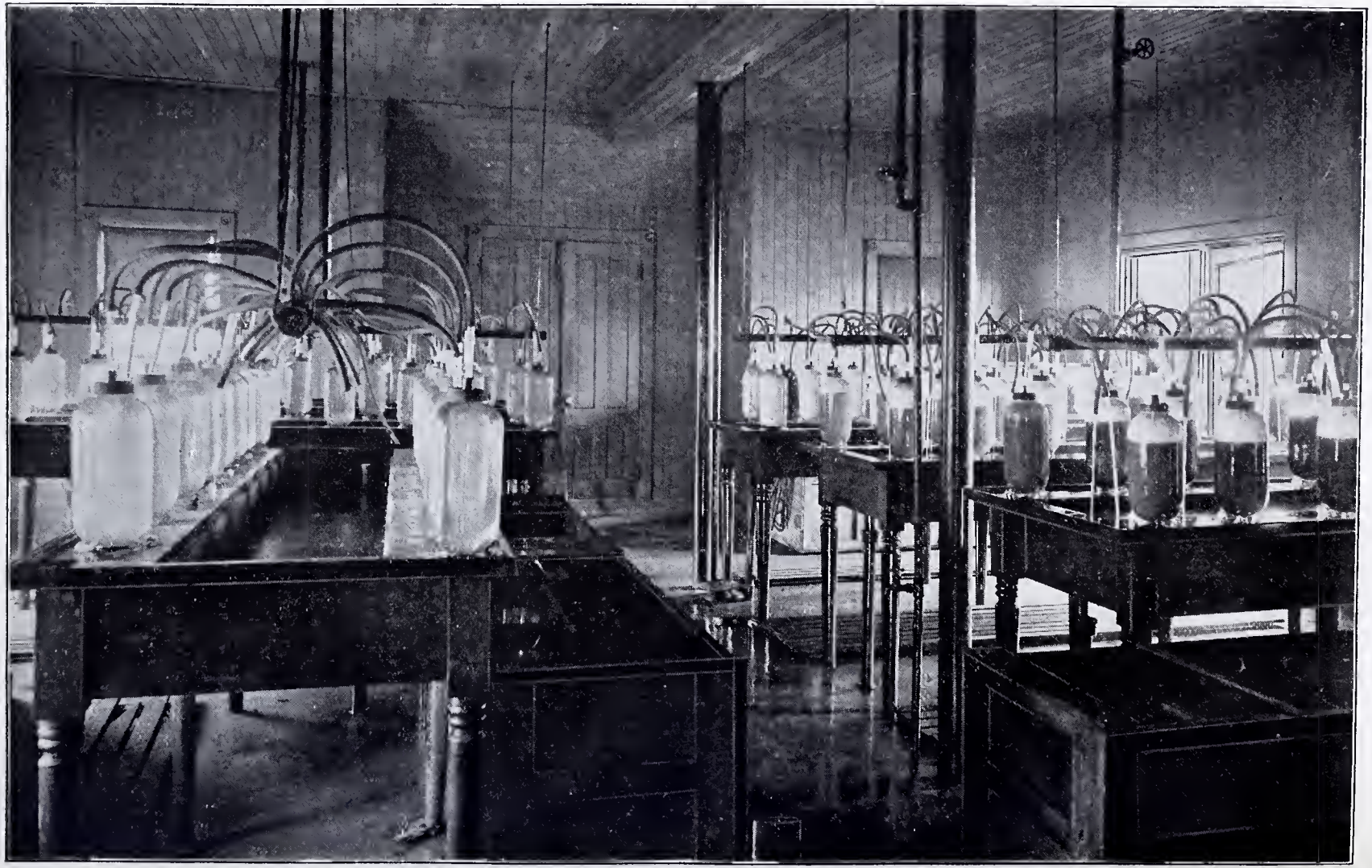
A trifle further on is the old Kingston Forge, where more than one disastrous Indian skirmish was averted by Colonel Ramsey and his small body of men, who acted as a bodyguard not only to Ligonier settlement proper, but were ever ready to lend assistance to their neighbors. Beyond this fighting ground, framed by a beautiful border of rhododendrons and mountain laurel, are the mammoth granite deposits, while directly opposite and across the stream is the park called Idlewood, where man has figuratively harnessed, with modern improvements and conveniences, nature's hills, vales and lakes into a limitless mountain park.

Few localities in the state have played more active or important parts in moulding its early history, and few have passed through such bitter and fierce struggles with the Indian, the traitor and the British. Here it was the first venturesome settlers, to protect their lives, erected the sturdy fort in which they found safe refuge.

Of the many streams which flow into the Loyalhanna in that section the largest is Four Mile run, which takes its rise at the head of Ligonier valley. Four Mile run has been the mecca of many a truant school boy who took his first lessons in chub fishing, and not a few of whom afterward developed into expert fishermen and extended their field of operations to the western slope of Laurel hill, which is streaked with a dozen or more trout streams, emptying into the Loyalhanna. All the waters in this locality have been stocked by the fish commission for years, and they yield a return to the average fisherman.

In a southeasterly direction from Ligonier valley, and at the very base of Laurel hill, is Laughlinstown, a favorite stopping place for trout fishermen who desire to commence their fly fishing at day break.

The water shed of that section extends as far as Knupp's tunnel, on the abandoned line of the South Pennsylvania railroad, or to a point near it. Here, on the southern slope, the headwaters of the Indian



INTERIOR ERIE HATCHERY.

creek valley take their rise. The stream of that name flows through a rugged and well-timbered region and finally empties into the Youghiogheny.

On the western or Chestnut ridge side of the valley there is only one stream known to contain trout, a creek called the Champion, but the western slope of Laurel hill is celebrated for its trout runs, as they are popularly called in that section.

Along the summit of the lateral ridge which connects Laurel hill with the Chestnut ridge, is an old turnpike road running from Mt. Pleasant to Somerset, passing through Donegal and the hamlet of Jones' mills. A drive over this picturesque old pike to a point near the top of the mountain, and three miles beyond the hamlet, brings one to the property of the Big Springs Fishing Club, an organization composed of Pittsburg gentlemen. Here is a club house and four hundred and fifty acres of worked land and more than a mile of fine trouting waters. This is a preserve that has been in existence for over twenty years and is well-known to everyone in the western section of the state.

Going in a southerly direction from this point one will meet with many excellent trout streams flowing into the Indian creek, while just over the crest of the mountain, on the eastern slope, are as many equally good waters and well supplied with brook trout. In fact the whole section here as far as the Youghiogheny on both slopes are covered with a perfect net-work of angling streams, though none of them are large.

This section also is the home of the moonshiners, and in the past few years many an honest fisherman has been spotted and marked as a spy in the revenue service. Here the angler is apt to frequently meet some hardy mountaineer with his hickory fish pole and horse-hair line with hook and worm, and with a large bottle of mountain dew, a fluid on which we may be sure no tax has been paid, in his capacious pocket. To the city angler this dweller of the hills will give a kindly greeting, and when once assured that the former is there only as a fisherman, and not as a spy, his hospitality is unbounded.

At this interesting point, where the lines of three counties, Somerset, Westmoreland and Fayette, meet with the famous old Shade creek, are the favorite fishing grounds of the people of the old town of Somerset, and a great resort of many people from Baltimore, who take great delight in whipping the streams thereabouts with much success.

Years ago, when that veteran angler, George Shiras, of Pittsburg, the father of the present Justice of the Supreme Court of that name, tramped over these hills and fished in all the streams there, that section was comparatively in a primitive condition. But Mr. Shiras has lived to see the country develope into a flourishing condition, with railroads running through it, and large timber interests, and with the years that have passed, the fame of Mr. Shiras as an angler has increased, until

the present day, on the eve of his ninetieth year, he is the most venerable and respected follower of old Isaak Walton to be found in the United States. The writer thus speaks of Mr. Shiras because the latter has almost a national reputation as an angler, and is yet an annual visitor to the Sault de St. Marie, where he is an honored guest of the old Chippewa house. There is a great arm chair brought out on his arrival at this old hostelrie for his special benefit on every fair day during his sojourn. The old gentleman is on the alert for trout, and it is not an uncommon thing for him to bring in several trout from three-quarters of a pound to three or four pounds in weight. If during his absence from the hotel anyone should be thoughtless enough to drop into the old chair, he is quickly reminded that it is the exclusive right of Mr. Shiras to occupy it, and he is politely invited to vacate.

East of this beautiful region in the Cumberland valley is the Newville spring, a great flow of limestone water, located at the village of that name near the line of the Cumberland Valley railroad. This stream is famous for its fine trout and the number it contains. It is one of the very first streams in the state, the banks of which are lined with eager fishermen on the annual opening day of the fishing season. It is the natural home of the speckled trout, but it has been plentifully stocked with California or rainbow trout, and it is one of the very few streams in Pennsylvania in which that species of fish has been known to propagate naturally. Newville spring has considerable depth and width and flows through the most beautiful portion of the Cumberland valley.

In this valley is also the Conodaquinet, a stream that has been plentifully stocked and is a favorite resort of the local fishermen.

At Shippensburg some years ago a Mr. Dyckman, who had accumulated quite a fortune in business enterprises, located and became owner by purchase of a large stream similar to that at Newville, where he engaged in the work of trout culture. On this property he spent much money and made quite an attractive place of it, so that many visitors came to his ponds. His work seemed quite successful, but whether his fish culture work still continues is unknown to the writer.

There is also at Carlisle, which has been mentioned in history and documents of record ever since the earliest of colonial days, a good trout stream or two, and others have been lately stocked.

Striking southwest to Westmoreland county, in the neighborhood of New Florence on the line of the Pennsylvania railroad is Tub Mill run, a most excellent stream, a tributary of the Conemaugh.

These streams mentioned are but a tithe of those which are to be found in nearly every section of the state, and which have afforded good sport for the angler for generations, and which are likely to for generations to come, of the beneficent laws now in operation continue to be enforced, and the wise policy now prevailing of assisting the fish commission in its good work.

CHAPTER XV.

Mountain Lakes of the State.

The people of Pennsylvania justly take pride in its natural lakes. While none of these bodies of water are as large as the smallest of the chain in the central part of New York, yet the greater number are much handsomer than they, and even rival in beauty and attractiveness the most famous of those in the great Adirondack region. The state abounds in these lovely sheets of water. There is scarcely a county through which a mountain range extends that does not possess several, and all are fair to look upon, while some have besides such picturesque surroundings that they have become popular resorts for people beyond the charm they hold for the angler. While there are lakes scattered all over the state the greater number are located in the northeastern part, in Pike, Monroe, Wayne, Susquehanna, Lackawanna, Wyoming, Carbon, Sullivan and Bradford counties. Of these counties Wayne probably has the lead in point of numbers, there being some one hundred and fifty within its borders, but Pike county is a close second in this respect, although in the opinion of many who have been in both sections, is far in the lead when inherent loveliness and picturesque surroundings are taken into consideration. Crawford county, in the northwestern part of Pennsylvania, is also prolific in natural lakes, and here too is the largest body of water in the state; it is called Conneaut lake and occupies nearly equal portions of Summit and Sadsbury townships. It is more than six miles long and possesses many charms.

The greater number of these lakes are the results of the great ice age which swept its frozen mantle of unknown depth over a great portion of this country countless ages ago. When glaciers poured their frozen masses down steep mountain sides some on retiring left behind huge terminal moraines which banked up small streams into pretty mountain lakes. Others in their awful flow gouged out great holes in the mountain sides until springs were come upon, which when the age of ice had gone, filled up to the brims the basins which had been made.

In Pike county every lake is at least one thousand feet above the sea and no two of them are alike. Some, such as Porter' pond, or Lake Tedyuscung, in Porter township, are shallow and cover an ooze bottom which cloud the waters a pale green, others, like Silver lake near Dingman's ferry, and High Knob pond, or Lake Laura in Blooming Grove township, are as clear as crystal. Among the most beautiful in the county are Silver lake and Lake Laura, the latter belonging to the Bloom-

ing Grove Park Association. It nestles high up on the sides of one of several isolated mountains of the Knob group of the Pocono range and covers 447 acres. It is kidney-shaped and in many places is said to be more than seventy feet deep. Its bottom is covered with huge boulders, some fully as large as a good sized house, the remains of the glacial epoch. In this water and among these boulders lie black bass in countless numbers and of prodigious size, making it emphatically the best resort for this species of fishing in the state. This lake was stocked many years ago by some gentlemen before it came into the possession of the Blooming Grove Park Association, and before they preserved it it was visited by illegal fishermen and others to such an extent that it was rapidly becoming worthless.

The Blooming Grove Park Association, composed mainly of New York sportsmen, own or controls upward of 20,000 acres of the wild land in Pike county, where they maintain a rigid fish and game preserve, though they are by no means illiberal towards sportsmen who desire reasonable privileges. More than a quarter of a million dollars have been expended in this county in fitting up and maintaining this great preserve, and it has been of much benefit to the hardy woodmen who live thereabouts. Last year alone over $5,457 were spent in improvements. Comfortable club houses have been erected, and a large fish hatchery is maintained to keep well stocked the many trout streams and the lakes within the borders of the association property. At this hatchery, more than half a million trout fry are annually incubated. During the year 1892, according to the score books of the members, 3,961 trout were taken, and 2,323 black bass killed.

From the top of High Knob mountain, one of the group in the Blooming Grove Park Association's preserves, on a clear summer day, no less than thirteen natural mountain lakes are to be seen, glistening in the sun-light like gems of pearl in settings of emerald. From the summit of this mountain a glorious view is obtained, though anyone venturing to make the ascent had better be provided with a bottle of water and a club for rattlesnakes, as there is none of the first and plenty of the latter after beginning the rough climb.

It is singular that none of the mountain lakes of Pike, Monroe or Wayne counties have trout in them except where artificially planted, for all the streams running into or from them are filled with this great game fish. Pike or pickerel and yellow perch, catfish or bullheads and sunfish are the fishes indigenous to their waters. This is stranger when it is known that one or two lakes, notably Perch pond or Lake Belle, after having been stocked with brook trout, did well.

One of the best stocked bodies of water in the county is Silver lake, near Dingman's Ferry. This enchanting sheet is of considerable size, with water as limped as dew and very deep. Originally, it contained little else than pike, but now, through the Pennsylvania Fish Commis-

sion, there is an abundance therein of wall-eyed pike, black bass, rock bass, white bass and strawberry bass. Lake trout were also put in this lake as an experiment, but thus far there do not appear to have been any good results.

As Wayne county has the largest number of lakes, the fish commission paid particular attention to their stocking. Pike-perch, strawberry, black, rock and white bass have been placed in great quantity in all of them, and in the deepest lake trout have been planted. These fish have nearly all done well, and have multiplied to a most gratifying extent.

The greatest success that has yet been met with in stocking lakes with pike-perch has been in Conneaut lake, in Crawford county. These waters now abound in this valuable food fish, although, but a few years have elapsed since they were first put in. Black bass planted in this lake at the same time have also thrived to a marvellous extent.

Eagle's Mere, in Sullivan county, is another lake which has received close attention from the fish commission. The waters of this lake are so deep and clear that they seemed especially fitted for lake trout, though none were indegenous. Five or six years ago, however, a number were deposited in this lake, and the results surpassed expectation. Lake trout twenty to twenty-four inches long are frequently taken, while small ones are very abundant, showing that they are naturally spawning and hatching.

Besides these lakes in the counties mentioned, there is Long pond, in Tunkhannock township, near the Phohoko mountains, in Monroe county, a handsome body of water that extends nearly across the township and affords good fishing. Besides this there are one or two other smaller lakes near the Delaware Water Gap, in the same county.

Susquehanna county also has within its borders many pretty lakes. The largest of these is the Stillwater, or great width of stream, in the township of the same name as the lake. Silver lake, in the northern part of the county, near Montrose, is also a beautiful body of water and contains a large quantity of good food fishes, and lake trout have recently been deposited therein. The best pond in Luzerne county is Harvey's. For many years this was one of the favorite fishing waters of the state, and to such an extent was it visited that finally it became almost depopulated. Then the Pennsylvania Fish Commission had it re-stocked heavily, and with the assistance of the residents thereabouts, laws governing fishing were enforced, and the results have been more than satisfactory, for once more Harvey's lake is holding a prominent place among angler's affections.

In Lackawanna county is Crystal lake—a body of water worthily named—that lies partly in Lackawanna and partly in Susquehanna county. Many people visit here annually and enjoy good sport.

A handsome pond in Wyoming county is Crooked lake, and its

irregular shaped body in Overfield township affords good fishing as does also Marcy's pond in Lemon and Tunkhannocy townships, the largest lake in that section.

Nearly all the natural lakes in Pennsylvania have been stocked from time to time by the fish commission, and there is not one but has been benefited thereby. In some, certain kinds of fish have been put in that did not thrive, even though the water conditions seemed favorable, but a trial with some other sort eventually succeeded. Black, strawberry, white and rock bass, pike-perch and lake trout have been the species usually used for stocking purposes, though occasionally some others have been tried with varying success. Of this last class, the rainbow trout have yielded the best results.

When this far-western game-fish was first experimented with in the east the mountain streams were tried, but for some reason they did not generally seem to thrive. Van Camp's stream, in Pike county; Hollister's creek, in Wayne; Newville, in Cumberland, and a few others elsewhere, there was greater or less success, but on the whole the experiment was disheartening, and except on local applications the work of stream stocking with rainbow trout has been practically abandoned. The reason for this failure has not been satisfactorily explained. Placed in waters apparently suitable, they often entirely disappeared almost immediately to turn up in another creek some distance away, the waters of which seemed not nearly as favorable for their habits or growth. A notable example of this was near Erie a few years ago. Here a certain stream near the city of Erie was plentifully planted with rainbow trout and for a time they seemed perfectly satisfied in their new home, but suddenly not one was to be found in the waters in which they had been deposited. A couple of years later fishes of this species were caught in great numbers in a stream two or three miles distant, where no fish of their kind had been placed. Both brooks emptied into Lake Erie, and it is supposed that not being satisfied with their first home they abandoned it for the lake and made their way into the waters where they were subsequently found. In this connection it is noteworthy that some of this fish must have remained in the lake, for recently they have been caught there in some numbers and they seem to be increasing.

When the experiment of stream planting with rainbow trout proved generally a failure, lake planting with this fish was attempted. In this, as remarked above, some success has been met with, probably because in bodies of this character they cannot indulge in their seemingly migratory inclinations. Many mountain lakes of the state, therefore, yield fair rainbow trout fishing, though not, and probably never will, equal the yield that other kinds do.

CHAPTER XVI.

History of the Black Bass.

When a survey of the waters of the state is made, and in every river and lake having hard rocky bottoms are found black bass, sometimes to the practical exclusion of other species of large fishes, it seems almost incredible that a little more than thirty-three years ago, not a specimen of this member of the perch tribe was to be found therein. Yet this is, as far as known, absolutely correct. For the introduction of this magnificent game and table fish the people are indebted, primarily, to the genial and enthusiastic angler, "Thad" Norris and, secondarily, a number of ardent Easton and Philadelphia fishermen.

Early in 1870 Mr. Norris, who was thoroughly acquainted with the habits, game, qualities and table merits of the black bass, feeling satisfied that this species of fish would do well in the waters of Pennsylvania, broached the subject of introducing a number to Mr. Howard J. Reeder and G. W. Stout. These gentlemen entered enthusiastically into the project and a considerable sum of money was speedily raised, Mr. Norris collecting about $1,000 and Mr. Stout $313.

With one-half the amount collected, about four hundred and fifty black bass were purchased at Harper's Ferry. These fish were mature specimens taken from the Potomac river, which was full of them, the river having been incidentally protected through the civil war.

The bass thus purchased were taken to the Delaware river, where they were deposited, October 26, 1870, just below the Lehigh dam at Easton. Shortly afterwards a number of other public-spirited citizens residing along the Susquehanna and Schuylkill rivers, purchased a number of fish from the same locality on the Potomac, paying therefor one dollar each, and planted them in those two streams.

The result surpassed their expectations. The fish took kindly to their new quarters and multiplied in such amazing quantity that in three years they were caught in the Delaware, Susquehanna and Schuylkill rivers in great numbers. Fish four and five pounds in weight were frequently caught in 1873. The voracity and eagerness with which they took both bait and fly, the stubborness and vigor with which they fought for freedom and life when hooked, speedily made them a favorite game-fish among anglers, many old brethren of the rod, indeed, declaring that the new fish yielded more sport than the speckled trout.

A welcome surprise to the angler, the black bass, was a disagreeable one to the net fisherman. To the indignant astonishment of the latter, when caught in the summer and fall, within the sweep or bag of the seine,

the black bass almost invariably made their escape from the deadly contrivance by leaping out of the water and over the upper or cork line of the net, and it was not until this species of fish capturer found that the black bass could not escape the iniquitous fish basket that it rose at all in his estimation.

So rapidly did the bass multiply in the Delaware river that three years after their introduction the fish commissioners were able to stock other waters therefrom, and in 1873 no less than two thousand and forty-four were captured near Easton and distributed throughout the State. These fish were transported to their new quarters under the personal direction of Mr. John P. Creveling, and so carefully was the work done that not a dozen fish were lost on the way. They were conveyed in ordinary fifteen-gallon milk cans, the temperature of the water being kept at about sixty-two degrees Fahrenheit. From twenty-five to fifty fish were contained in each can, and Mr. Creveling required six men to assist him in the work of caring for them during the journey. These bass were deposited in the Lehigh river, the North and West branches of the Susquehanna, the Juniata and its branches, the reservoir near Hollidaysburg, Yellow Breeches creek, Pequa creek, Chiquesalonga creek, Octorora creek and Codoras creek.

So great was the demand for black bass, almost as soon as its qualities became known, and so limited were the financial resources of the commissioners that in 1873 these gentlemen were compelled to announce that they could supply but a limited number to each applicant, and then only on the individual paying the freight. This, it is related, was cheerfully done.

Through not thoroughly understanding the habits of the black bass, the commissioners, in 1874, were able only to capture 1,985 fish for stocking purposes. These were placed in Muncy, Swatara, Conestoga, Mill, Brandywine, Pine, Conroy, Canton, Buffalo, Pine, Penn, Wissahickon, Little Conewago, Conodoguinet, Marsh, Big Conewago, Big and Little Chiquesalonga creeks, Susquehanna, Conoquenessing, Allegheny and Lehigh rivers; also in Saylor's lake and Porters and Twelve Mile lakes, in Pike county. In Porter's lake the bass never succeeded, owing to the muddy nature of its bottom, but in the others they speedily made themselves at home and multiplied, Twelve Mile pond; indeed, being now well known as far away as central New York for its bass-fishing qualities.

As may be supposed the wonderful success met with by the fish commissioners in stocking the waters of the state with this great game fish, caused those gentlemen to study them with great eagerness and devise means to increase the supply by artificial propagation. This, however, was found exceedingly difficult and unprofitable; what few were hatched were neither healthy or suitable for planting. This attempt was therefore adandoned. There was, however, little need for artificial propaga-

tion. The black bass may fairly be put down as one of the most prolific and valuable of our fresh water fishes. Their fertility is wonderful, a pair of large bass will deposit from 20,000 to 30,000 eggs, and these are guarded with Spartan like fidelity by both parents, alternately relieving each other, watching all intruders with jealous eyes and attacking them with great ferocity should they approach too near. Even after the young are hatched the watchfulness of the parents is still kept up for some weeks, their numerous enemies are battled with, and the little ones are taught to forage and obtain food suitable to their taste and condition.

The very rapidity with which they increased caused in a few years fear, less they would drive out all other fishes, but this fear soon proved groundless. Discussing this possibility the fish commissioners in their report for 1883–84, say "while all will admit that the black bass is one of the most prolific, palatable and gamey of our fresh water fishes, the question has arisen and is being warmly discussed, whether its introduction into the waters of eastern Pennsylvania has been a blessing or otherwise.

"Nearly everybody, but especially sportsmen, anticipated great results from their introduction. Anglers were especially delighted, while commercial fishermen, turning their eyes towards the Potomac, which was producing great quantities of bass, looked hopefully forward to the time when the streams of our own state would yield a like harvest. As the trout streams in nearly every portion of the state had become practically barren, the black bass were welcomed with sincere joy. Anticipation ran high and it cannot be denied that it was fully warranted by the almost immediate rapid increase in numbers and size of the new comers.

"That those bright anticipations were ephemeral, and that they were realized but for a very brief period, needs not the saying. In some cases the bass were roundly denounced as nuisances, and among the loudest and most vigorous complainants were those who were of those who, only a little while before, had been their most zealous champions. The strangers were charged with not merely devouring other fish too weak to defend themselves against such powerful assailants, but that when they had exhausted that source of food supply, with turning upon and devouring their own progeny; that ultimately they would have entire possession of the streams, and that, eventually failing to find the required supply of animal food, would themselves become extinct. In proof of the latter allegation, the gradual diminutions in the annual catches in the Potomac and Susquehanna were pointed to.

"Now, all this may be true, and it may not. The friends of the black bass while admitting their ravenous disposition, stoutly deny that the bass are indiscriminate exterminators of weaker fish, or that there is

the slightest evidence of diminution in their numbers, save such as can be readily traced to the deadly fish-basket and other illicit contrivances for catching and killing them.

"They insist that as far as the Susquehanna and Delaware are concerned, the minnows destroyed by the bass are those which depredate upon the spawn of the shad and the perch, or wall-eyed pike. Moreover, they contend that if the rivers were depopulated of minnows, it would pay the state handsomely to hatch shad largely for the special purpose of supplying food for the bass.

"From this it will be seen that this fish may not be as black as it is painted. Stronger evidence than has yet been presented is wanted by the board before determining what course shall be pursued."

About this time a gentleman residing on the Susquehanna, a very strong friend of the black bass, came forward in defense in a letter to the Board of Fish Commissioners. In it he says:

"There is a very decided increase of the native salmon, pike-perch, or wall-eyed pike, in this river. Last year (1878) hundreds were taken, averaging a foot in length and about three-fourths of a pound in weight. This increase is accounted for by the fact that the bass destroyed the small fish that preyed upon the eggs of the pike. If the laws now on the statute books against fish-baskets and nets are enforced, these fish, which grow to a weight of ten pounds, will naturally increase. Until that is done, there is no room for the hope that there ever will be a material improvement in the product. Last fall, at the dam below Sunbury, there was taken out in a single night, by one of those infernal machines and seines, no less than fourteen hundred pounds of bass and salmon. In other parts of the main river, and in the Juniata, the average catch of each basket at night, when the water was about three feet above the ordinary height, was at least fifty young salmon, about twelve inches in length."

Another gentleman reported to the board that he had seen two bushels of young bass taken from a single basket in one night. Another, that a man of his acquaintance fed five bushels of young bass to his hogs in less than one week.

Yet, at the session of the legislature concluded this year, there were men who came to the members and claimed that no fish protective laws were needed, and asked that the iniquitous fish-baskets be legally restored to the rivers.

That whatever fall off there was in the supply of black bass, was due almost entirely to fish-baskets and other illegal devices for catching them, was soon after abundantly demonstrated. By vigorous measures the Delaware river was cleared of all fish-baskets and traps, but such a laudable result did not follow similar efforts in the Susquehanna. Almost immediately the catches in the former stream began sensibly to

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increase, and does to this day, while those of the latter water-course is steadily declining. As long as fish-baskets are allowed to remain in the rivers just so long may the people expect to have poor results either for sport or commercial purposes. Remove them, and see that all the laws for the protection of fishes are enforced, and the waters will once more speedily teem with a valuable table food.

CHAPTER XVII.

Other Work of the Commission.

Besides the efforts made by the Pennsylvania Fish Commissioners for the restoration of the shad-fishing industries in the rivers of the commonwealth, for the white fish industries of Lake Erie, for the increase of pike-perch and for the establishment of the black bass in all the suitable waters of the state, they early paid earnest attention to the re-stocking of the trout streams of the state. In this endeavor they have been eminently successful. As remarked in a former chapter, the early output of fry was not only small, but the work of the commission being but little known, there was only a slight demand for the fry. But the light of the commission was not long hidden. By 1877 the output of brook trout fry had reached 154,000, then considered an enormous number. The following year 253,200 were distributed. From 1879 to 1881, inclusive, 595,600 brook trout fry were deposited in suitable waters in the state, an average of 198,500 annually. In 1882, however, a great leap was made and 449,200 young trout were liberated in the mountain streams. Through various adverse circumstances, only 110,500 brook trout were distributed in the next two years, but in 1885 the figures were nearly repeated, 400,000 being planted, and in 1886 it was slightly exceeded, the number being 490,100. The following year another considerable advance in the number propagated was made, and 689,000 speckled trout were sent out from the two hatcheries. This would have been exceeded in 1888 except for a disease which attacked the fry in the eastern hatchery, at Allentown, which destroyed over 400,000. As it was, applications to the number of 560,500 were filled. With increased facilities in the two hatching houses, in 1889 and 1890, 2,694,900 were planted, and in 1891, 2,508,000. Altogether, since the work of artificial propagation commenced, to and including the present year, nearly 12,000,000 brook trout fry have been hatched and distributed. The rich yield of streams which a few years ago had become almost barren, and the encouraging results of others which had been barren for many years, are themselves indisputable evidence of the value of the work done by the fish commissioners at a nominal cost to the state.

SALMON.

There is a tradition that at one time the Delaware was a salmon river, but of this there is little or nothing on which to test its truth. It was, however, the almost universal opinion, that whether the tradition was

true or not, the waters were suitable for this great game and king of table fishes, and as early as 1871 it was decided to try the experiment by planting some fry. A number of gentlemen in Easton and Philadelphia, interested in fish culture, accordingly raised a sum of money and purchased 10,000 salmon eggs of a Mr. Wilmot, of New Castle, Canada, then in charge of the government hatching house of the British Dominion. These eggs were placed in charge of Mr. Christie, a pisciculturist, of Duchess county, New York. He hatched them successfully, and the fry, when about an inch and a quarter long, were taken by the late Henry A. King, a conductor on the Central Railroad of New Jersey, to Easton, which was reached on Decoration day. Although carefully attended by Mr. King and Mr. Christie, who also accompanied the young fish on their journey, the weather was so hot that only about 2,500 survived, and these were in a very weak condition. A portion of the fry were placed in the spring of Paul Rader, on the Bushkill, about four miles above Easton, and the remainder in the springs of Benjamin Lerch and John Lerch, on the same stream, a tributary of the Delaware river.

In the following year, the same gentlemen made a purchase of 13,000 more eggs. Mr. Thaddeus Norris took charge of these himself, and undertook to have them hatched under his own supervision at a spring about a mile from Easton. Notwithstanding the hatching boxes were of the rudest description, Mr. Norris succeeded in successfully incubating 11,000. These were also placed in a tributary of the Delaware.

Noting the efforts of these gentlemen Prof. Baird, the United States Commissioner, presented the state with 40,000 salmon spawn taken at Buckport on the Kennebec river, and a like number to the State of New Jersey in the early spring of 1873. Mr. Norris again put the hatching boxes at Easton into service and brought forth 27,000 young salmon, while Dr. Slach incubated 33,000 of the 40,000 eggs given New Jersey, at his private hatching house at Troutdale in that state. Eighteen thousand of these were deposited in one of the tributaries of the Delaware along with those hatched by Mr. Norris, so that in three years no less than 58,500 *salma salar* were planted in the Delaware river.

In the meantime while this work was being done in the Delaware, attempts were being made to stock the Susquehanna with another species of salmon, the California. In 1873, six thousand of these fish were presented to the state and deposited in the Susquehanna, near Harrisburg, and in the fall of the same year 21,000 more were placed in different cold springs, rivulets and creeks emptying into the same stream.

These two efforts naturally excited much interest and a close watch was kept for results. The young fry were soon heard from, a number of those placed in the Delaware in 1871 and 1872 being caught by ignorant fishermen and killed under the impression that they were trout.

In 1877 much excitement was caused by the capture of a large salmon thirty-two inches long in Givetzinger's mill race on the Bushkill at the foot of Fourth street. In the same year a number of others were taken in the Delaware, and one "fine specimen" presumably a Pacific salmon, in the Susquehanna. Between that date and 1879 several other specimens were captured in the Delaware river, some of them weighing as much as twenty-five pounds, and on May 11, 1879, a female, measuring three feet four and a half inches, and weighing about seventeen pounds, was captured in a gill net off Spesuter Island in the Susquehanna river, by Mr. Frank Farr, of Havre-de-Grace.

But these catches practically ceased after 1879, and the fish commissioners were compelled in 1884 to admit that the experiments were failures, and concluded that it would "be a waste of time and money to repeat" them. "The waters of Pennsylvania," they believed "are evidently not suited to this fish, however desirable it would be to have it planted and thriving in them."

The succeeding board of commissioners, however, were not satisfied, that—though the experiments of Thaddeus Norris and others in planting salmon in the Delaware river, were failures, further work was hopeless. They saw that the New York commision had received a fair measure of success in stocking the Hudson river with this noble fish, and they felt that the Delaware ought to be as equally good as that river. Its freedom from artificial obstructions, its long rifts and splendid pools, the purity and low temperature of its upper waters, so pure and cold that trout thrives therein for over one hundred miles below its source, all filled the requirements of a salmon river. Notwithstanding, therefore, the first failures, the present commissioners in 1889 secured 100,000 eggs of the Penobscot salmon from the United States Commission and had them hatched at Allentown. The fry, all strong and vigorous, were deposited in the streams tributary to the headwaters of the upper Delaware, in Wayne county. Two years later, 300,000 more eggs were hatched at Allentown and Corry and deposited in the same streams. Although yet too early to speak positively as to the results of this work, there is every reason to believe that the experiment will at least not prove a total failure. The young smelts were seen in the Delaware in considerable numbers last year, and this year large numbers of the planting of 1891 have been observed as well as vigorous fish of those hatched in 1889.

Grayling.

The earlier commissioners had an idea that grayling might be added to the fishes of the state, and consulted with Mr. Norris as to the possibilities of doing this. That gentlemen gave but little encouragement to the project, pointing out that, with very few exceptions, the streams of the state appeared to be suitable to the fish as those of their own

State of Michigan. Notwithstanding this an attempt was made to transplant them, but the experiment proved an utter failure, largely due, it is thought, to the fact that they could not be artificially propogated, and that what fry were brought from their native waters could not take care of themselves like the black bass against all comers.

Salmon Trout.

As early as 1873 the commissioners were attracted towards the salmon or lake trout. Their noble size, rich flavor and game qualities made them especially desirable for transplanting into Pennsylvania waters if it could be done. In that year many thousand fry were hatched and distributed, and the same was done in 1874 and again in 1875. The fry was placed in deep, large pools created by the suction of large dams in the rivers of the state, but the fish did not take kindly to the quarters provided for them.

Failing in this, the commissioners turned their attention to the deeper mountain lakes, and here they met with great success. In nearly every case where this kind of water was chosen the fish have thriven wonderfully well.

Grass, Rock and Other Bass.

The phenomenal success met with in stocking the rivers, lakes and streams of the state with black bass, led the commissioners to try the experiment with other members of the perch tribe. Among the first to be introduced was the grass bass, a fish which loves deep and sluggish waters, which yet will thrive in streams that are cold and rapid running. In 1876 some two hundred one and two-year-old fish were captured at the Licking reservoir, about ten miles from Newark, Ohio, and brought to Pennsylvania. During the next two years more than two thousand of this species of fish were shipped from Ohio and placed in the waters of the Juniata, near Hollidaysburg. These fish thrived wonderfully well, surmounting all difficulties and soon found their way into the Susquehanna, where they are quite numerous. About the time that the grass bass was introduced, the advisability of transplanting the rock bass, or goggle-eye, from western waters and Lake Erie to those of Pennsylvania was contemplated; but it was not until 1887 that any attempt was made to carry the experiment into operation. In that year one thousand two hundred mature rock bass were captured in Lake Erie and deposited in the Susquehanna, Lehigh, Schuylkill, Delaware and other streams. This toothsome, as well as game-fish, took as kindly to their new homes as their cousins, the black bass, and with subsequent stocking have become very numerous in the streams where they were planted. The blue sunfish, yellow bass and white bass have also been introduced into Pennsylvania waters with fair or excellent success.

German Carp.

Every German who came to this country remembers with longing the one great food-fish of his fatherland. The work of the Pennsylvania Fish Commission, therefore, had scarcely become known, than there went up a demand for the establishment of German carp in the waters of Pennsylvania. This demand was received with much satisfaction, for the value of this species of fish was already well known. Fry were obtained as soon as possible and distributed, all three varieties being sent out equally. The greater number were given to farmers, but many were planted in streams.

Wherever they were put the German carp appeared at once to make theirself at home, and there is little doubt that the waters of the commonwealth are filled with them, but as they do not bite ready at the hook the fish finds little favor among anglers, but those who regard the carp purely as a food-fish have reason for congratulating themselves on its introduction.

CHAPTER XVIII.

The Rogers Fishway.

The fishway question is one of such magnitude in the work of preservation and propagation of the fisheries to-day, that no history would be complete without showing the advancement made in this branch of the art.

Rivers may be stocked each year with millions of infant fish by artificial process, but being obstructed by dams and falls, the young life is cut off and destroyed before maturity. Provide a free and easy passage over these obstructions, and the result will be a marvelous increase of fish. Nature, with little artificial assistance, will then stock the rivers, which will become a source of great revenue as well as of noble sport.

The fishway which, after severe and most satisfactory tests, was adopted by the State Board of Fish Commissioners, is the invention of William H. Rogers, of Nova Scotia, for many years identified with the Canadian fisheries department as commissioner for that province. Mr. Rogers, being a thoroughly practical man, took advantage of the splendid opportunities there presented for research and experiment in this branch, which terminated in a perfect solution of the troublesome problem of the reconciliation of water power and the fisheries, the value of which can be only understood by a knowledge of the interests involved. It is not, however, the purpose of this sketch to discuss the many phases of this question, but simply to give a brief description of the invention, and together with illustrations (see engravings) to convey a comprehensive idea of the general principles of its construction; and to show that beside embodying all the requirements for the ascent of fish over dams and falls, it also overcomes a most fatal objection common to other devices of this nature, namely, the liability to destruction by freshets and ice, so common to the rivers of this state, which, during the early spring, are filled with immense quantities of broken ice, gorging and tearing onward with the swollen tide, leaving behind vast trails of destruction.

In the application here shown the fishway is so closely connected with the obstruction and has so small a portion projecting above, that the ice can find no hold upon it. Being on longitudinal lines with the dam, it simply takes the place of a portion of the apron in shedding the water and ice. This, however, is but one form of the many applications, all of which are equally staunch and effective.

As the construction of a dam is guided by the formation and conditions of a river, so must a fishway be located and built to meet the ex-

egencies of both dam and river, and at the same time it must provide for the erratic requirements of the fish.

In all the applications, the entrance is located close to the dam, where the fish, instinctively searching for a passage to the river above, most naturally linger. This feature is a most important and commendable one, and to it is largely due its unprecedented success.

The interior arrangement is very simple, consisting of a sluice-way five feet wide by three feet deep, running at a grade of about one foot in nine or ten, provided with a series of fences (called buckets) set at acute angles on either side, leaving openings of fourteen inches, allowing for the passage of a sufficient volume of water to accommodate the largest river fish. These buckets so retard the water that its force is reduced to a minimum, and the arrangement is so perfect that at whatever the height of the obstruction, or whatever the length of the fishway, the current is no stronger at the bottom than at the top.

The fishway proper is built solidly within square timber crib-work, bolted to the bed-rock and to the dam and heavily ballasted with stone, the whole being substantially covered with heavy plank, except the lower side of the crib, through which the light is allowed to enter. Against the small projecting portion at the head is provided a substantial ice-head, which is given an easy slope, thus presenting little resistance to the ice. A breakwater is also provided, which renders the entrance clear from falling water.

In fact, so perfectly are all the requirements met, and so completely has Mr. Rogers overcome the many heretofore existing difficulties, that there is nothing further to be desired in a fishway.

The comparatively small cost of construction is another commendable feature, it being principally guided by the market prices of the materials used and by the obstruction to be overcome.

Briefly summed up, its strong features are:

1. Applicable to any form of dam or natural fall.
2. The entrance is near the dam, where fish accumulate in search of a passage to the water above.
3. The stream is as near a natural brook as can be produced.
4. The current is easy—just strong enough to be an attraction to fish.
5. Each bucket forms a pool such as fish delight to play in.
6. It draws a very small quantity of water, and this can be shut off at any time if found necessary.
7. It is thoroughly ice proof.
8. Not liable to clog up, requiring only ordinary care, as small debris can pass through very readily and large matter cannot enter.
9. Repairs are seldom necessary when properly built at first.
10. Never known to injure a dam or water power in the slightest degree, but, on the contrary, it is a support to the dam.

CHAPTER XIX.

The State Fish Exhibit.

The legislature at its last session made an appropriation of $8,000 in order that the fish commissioners might make a creditable exhibit of the piscatorial work accomplished. Preparations were immediately begun to carry out this work, and Col. John Gay, a former member of the commission, was appointed manager.

Fisheries Building, Jackson Park,
Chicago, Ill., *April 25, 1893.*

The exhibit consists principally of live fish of the different varieties, propagated by the fish commission of the state, together with many of the lake fishes. It is made in aquavia constructed of iron and French plate glass, the largest being six feet, three feet long, three feet wide and three feet high, and so arranged that the fish can be seen to the best advantage. The space allotted to the Pennsylvania State Fish Commission in the Fisheries Building is one of the largest, 1,701 square feet of kite shape, running along the main hall, the entrance being at the small end of the kite. At the entrance there is an arch twenty feet in height, of rustic work made up of cedar and oak bark, trimmed with laurel roots over which vines will run. At the centre of the arch the keystone appears bearing the state coat of arms. Entering, the visitor will see two pools containing a working model of the Rogers' patent fishway practically illustrating the best known method of passing fish over dams, in their movement up streams in search of suitable spawning grounds. These pools are supplied with water by a cascade which tumbles down over artificial falls from the highest point of the roofing over the aquavia. The work thus built up conforming to the apex of the kite was a tunnel lined with oak bark and dotted with twisted roots of laurel. The aquavia numbering twenty rest upon stout supports covered with cork bark; at the bottom there is a row of natural stone. The tunnel being dark, the light from without showing through the glass sides of the aquavia, and exposing what they contain to visitors passing through the tunnel.

On all sides of the rustic work beautiful green plants have been found, and evergreens cover the entire top of the tunnel and present a very fine appearance. Models of the hatchery buildings at Allentown, Corry and Erie, are near the main aisle and over them hang enlarged photographic views of the several stations, the transportation car, and photographs of the members of the commission. Fifteen beautifully

executed water color drawings of fishes indigenous to Pennsylvania waters and handsomely framed hang on the sides of the arch. Fish hatching apparatus is also arranged on the floor space, and the centre column supporting the roof, is covered with cedar bark, and represents the body of a tree on which hangs a reel and fishing rod, with two landing nets crossed. Above the decorations described, seines with walls attached are hung in graceful festoons. Directly off the aisle at the entrance to the building from the arcade is a neat little office formed by partitions, just large enough for a desk, and two or three chairs, where visitors will be welcomed by the representative of the commission. The aquaria were constructed by J. W. Fiske, proprietor of the Variety Iron Works of York, Pennsylvania. The decorations by J. J. Stoberniche & Son, of Philadelphia, and the plumbing by E. Baggot & Son, of Chicago, Ill.

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